

# NUYTSIA

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Department of Agriculture of Western Australia



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## Taxonomic Revisions in the family Haloragaceae

### II. Further notes on *Haloragis*, *Haloragodendron* and *Gonocarpus*

By A. E. Orchard\*

#### Abstract

Additional notes are provided on new records and re-collections of seven species of *Haloragis*, one species of *Haloragodendron* and fifteen species of *Gonocarpus*, mainly from Western Australia. One new species, *Haloragis dura*, is described, and the division of *Gonocarpus* into two sections, sect. *Gonocarpus* and sect. *Simplum* is proposed. Three species previously known only from incomplete material are redescribed.

While a recently completed revision of *Haloragis* and related genera was in press (Orchard, 1975), a number of new records and re-collections of poorly known species became available. As withdrawal of the manuscript to incorporate these changes was not feasible, they are presented here as a supplement to that paper. To facilitate comparison, the same numbers have been given to the species as in the original work. Amended maps and supplementary illustrations are provided where necessary.

#### HALORAGIS

##### 12. *Haloragis trigonocarpa* F. Muell.

A collection of this species by Royce (Royce 5921, 16.vii.1959, Dorre Island, PERTH (fl.)) from Shark Bay is the first record from an offshore island. Several collections from the nearby mainland were listed previously.

##### 13. *Haloragis acutangula* F. Muell.

Recently collected material of *H. digyna* from near Esperance forms a link between that species and plants formerly (Orchard, 1975) described as *H. acutangula* f. *occidentalis*. It is still unclear whether all of the Western Australian plants listed under *H. acutangula* f. *occidentalis* (including the type) should be transferred to *H. digyna*, or whether some of them are best retained in *H. acutangula*. Further collections in flower and fruit are required from coastal areas between Albany and Eucla, to help decide this question. (See also under *H. digyna*).

##### 14. *Haloragis aspera* Lindl.

In my previous paper two Western Australian collections (Blackall 1221, Gardner 2919) were referred to this species. Both collections were in flower only, and although differing from typical *H. aspera* in some respects, they were placed in this species until further material should become available. Four more collections have now been made from the Norseman-Widgiemooltha area, all bearing flowers and fruits, and all matching the two previous collections. Now that complete material is available it seems that these Western Australian plants differ from *H. aspera* in a number of characters, including leaf shape, size and shape of the secondary bracts of the inflorescence, and most

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noticeably, in fruit shape. They are therefore placed in a separate species, *H. dura*, distinct from, but closely related to, *H. aspera*. *H. aspera* s.str. is now considered to be absent from Western Australia.

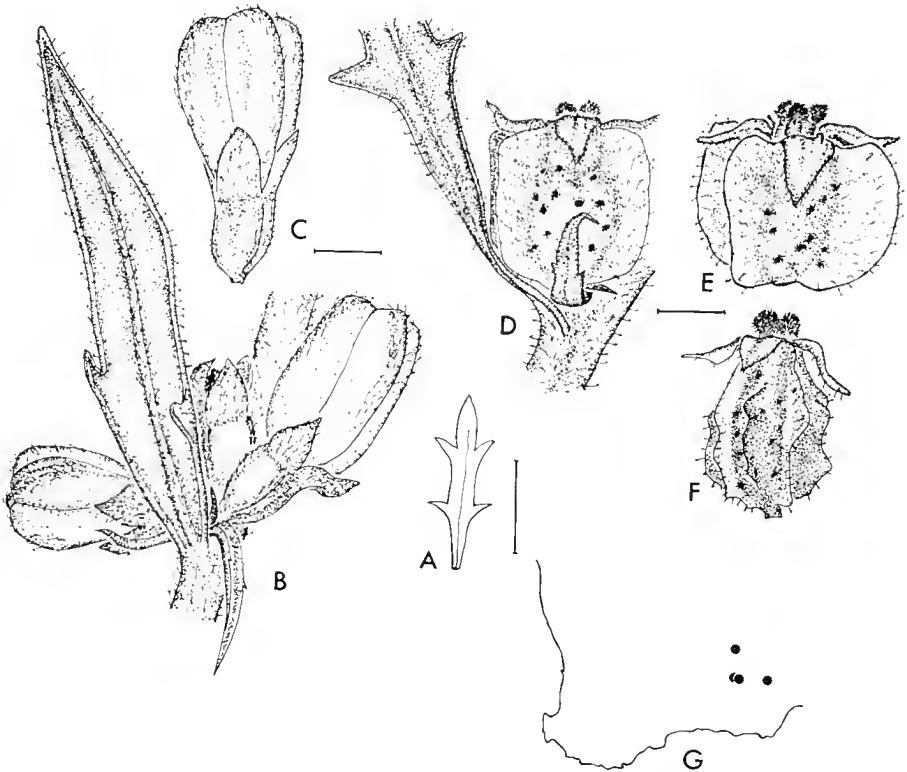


Figure 1—*Haloragis dura*. A. Leaf. B. Portion of inflorescence, showing primary, secondary and tertiary bracts. C. Flower just before anthesis. D. Portion of infructescence. E, F. Fruits. G. Distribution. (A,D,E. from Orchard 4186; B,C,F. from Orchard 4187). Scales represent 1 cm (A.) or 1 mm (B–F.).

#### 14a. *Haloragis dura* Orchard, sp. nov.

Figures 1, 2

*Herba* perennis 25–35 cm alta, caudex stoloniformis, caules erecti herbacei dense vestiti pilis simplicibus 2–3-cellularis pellucidis apice uncatis 0.2 mm longis. *Folia* alterna lanceolata vel oblanceolata vel subcuneata sessilia (1.2–)1.5–2.3 cm longa (0.3–)0.5–0.8 cm lata dentibus 4–6 falco-deltoidibus scabra.

*Flores* 4-merus, in spicis dichasiorum sessilium (1–)3-florum. *Bracteae primariae* foliaceae lanceolatae 0.7–1.0(–1.3) cm longae 0.2–0.4(–0.6) cm latae 2–4-dentatae scabrae. *Bracteae secundariae* membranaceae lineares 2.0–3.0(–4.0) mm longae 0.3–0.4 mm latae plerumque dentibus 2 parvis scabrae. *Bracteae tertiariae* membranaceae lineares 1.0–1.2 mm longae, 0.2 mm latae integrae scabrae. *Sepala* 4 ovata 1.0 mm longa 0.7 mm lata dense vestita pilis uncatis. *Petala* 4, 2.5–2.8 mm longa 0.6–0.7 mm lata scabra in carina. *Stamina* 8, antherae 1.8–2.0 mm longae. *Styli* 4. *Ovarium* ovoideum 0.8–1.0 mm longum, 0.5–0.8 mm latum, infirme 4-angulatum, dense scabrum, 4-locellatum, ovulum 1 per loculum.

*Fructus* oblongus 4-alatus, 2.5–3.0 mm longus 2.6–3.0 mm latus (alae inclusae), alae 0.5–1.0 mm latae raro ad costas deminutas, irregulariter foveatus et verrucosus inter alas; sepala persistentia patentia deltata 1.3–1.4 mm longa 0.9–1.0 mm lata; loculi 4, semen 1 per loculum.

*Holotypus*: A. E. Orchard 4186, 23.xi.1974, Western Australia: ca 50 km south of Widgiemooltha. On roadside at edge of bitumen, AK (fl., fr.). *Isotypi*: CANB, PERTH, AD, L, MO.



DUPLICATE SENT TO: DR. CRISP, PERTH, A. PRO

Figure 2—Holotype of *Haloragis dura*.

*Perennial herb* 25–35 cm tall; rootstock stoloniferous; stems erect, green, herbaceous, unribbed, densely clothed with simple 2–3-celled hyaline hairs 0.2 mm long hooked at tip. *Leaves* green to subglaucous, alternate, lanceolate to oblanceolate or subcuneate, (1.2–)1.5–2.3 cm long, (0.3–)0.5–0.8 cm wide,

scabrous on both surfaces with hooked hairs as for stems, serrate with 4-6 falcate-deltoid teeth 2-3 mm long; apex acute; margin revolute; midrib sunken above, prominent below; other veins indistinct.

*Inflorescence* an indeterminate spike of (1-)3-flowered dichasia borne in axils of alternate primary bracts. Lateral inflorescences arise in axils of upper leaves. *Primary bracts* green, leaflike, lanceolate, 0.7-1.0(-1.3) cm long, 0.2-0.4(-0.6) cm wide, 2-4-dentate, midribbed, scabrous on both faces, with revolute margins. *Secondary bracts* (green-)straw-coloured, membranous, linear, 2.0-3.0(-4.0) mm long, 0.3-0.4 mm wide, usually with 2 small teeth, weakly midribbed, scabrous on outer face. *Tertiary bracts* straw-coloured, membranous, linear, 1.0-1.2 mm long, 0.2 mm wide, entire, scabrous.

*Flowers* 4-merous, + sessile. *Sepals* 4, green, ovate, 1.0 mm long, 0.7 mm wide, densely scabrous with hooked hairs. *Petals* 4, red, 2.5-2.8 mm long, 0.6-0.7 mm wide (keel to margin), hooded, keeled, shortly unguiculate, scabrous. *Stamens* 8; filaments 0.2-0.3 mm long; anthers red to yellow, linear-oblong, 1.8-2.0 mm long, 0.3-0.4 mm wide, 4-celled, nonapiculate. *Styles* 4, clavate; stigmas red, capitate, fimbriate. *Ovary* ovoid, 0.8-1.0 mm long, 0.5-0.8 mm wide, slightly 4-angled, densely scabrous, 4-locular, 1 ovule per locule.

*Fruit* reddish-green, usually solitary in axil of primary bract, on pedicel ca 1 mm long, oblong, 4-winged, 2.5-3.0 mm long, 2.6-3.0 mm wide (including wings); wings 0.5-1.0 mm wide, rarely reduced to ribs; fruit irregularly pitted and verrucose between wings, scabrous; sepals persistent, spreading, deltoid, 1.3-1.4 mm long, 0.9-1.0 mm wide; 4 locules, 1 seed per locule.

*H. dura* is confined to the Norseman-Widgiemooltha region of Western Australia, where it is found in red, sandy, often stony, soils. It is locally abundant on roadsides, particularly in the gutters at the edge of the road. The epithet "*dura*" refers to its harsh, dry texture, even when fresh. *H. dura* belongs to the *H. aspera*-*H. uncatipila* alliance, but can be distinguished from these species by a number of characters. The key in Orchard (1975) should be amended as follows:

- 18. Hairs hooked at tip, 2-4-celled, 0.1-0.5 mm long.
- 22. Fruit ovoid, pyriform, globular or winged, exocarp not swollen or spongy.
- 22a. Secondary bracts 1.2-1.4 mm long, entire; leaves usually more than 6-toothed; fruit ovoid, pyriform or globular, if ribbed, then ribs only in upper part of fruit; sepals in fruit erect. 14. *H. aspera*
- 22a. Secondary bracts 2.0-3.0(-4.0) mm long, often 2-toothed; leaves less than 6-toothed; fruit usually 4-winged, or if wings reduced to ribs, then ribs run entire length of fruit; sepals in fruit spreading or reflexed. 14a. *H. dura*
- 22. Fruit globular, exocarp swollen, spongy, sepals erect or reflexed in fruit. 15. *H. uncatipila*

From *H. hamata*, *H. dura* is easily distinguished by its relatively shorter, broader leaves and larger fruit with 4 oblong longitudinal wings and regularly 4-locular ovary, and from *H. acutaugula*, *H. odontocarpa*, *H. foliosa*, *H. aculeolata* and *H. scoparia*, *H. dura* is distinguished by, *inter alia*, its hooked hairs.

*Specimens examined*: Blackall 1221, 30.x.1931, hills 7 miles [11 km] from Norseman, PERTH (fl.); Gardier 2919, 27.x.1931, Norseman, PERTH (fl.); Orchard 4176, 23.xi.1974, Fraser Range ca 115 km east of Norseman, AK, PERTH, CANB (fl., fr.); Orchard 4185, 23.xi.1974, 5.5 km west of Norseman, AK, PERTH, CANB (fr.); Orchard 4186, 4187, 23.xi.1974, ca 50 km south of Widgiemooltha, AK, CANB, PERTH (fl., fr.).

The specimen Orchard 4185 differs from the other fruiting collections in that in most of its fruits the wings are reduced to small ribs. However in other respects this specimen agrees with the description of *H. dura* given above.

# 17. *Haloragis foliosa* Benth.

Figure 3

Two further collections of this poorly known species have been made from the mid-west coast region of Western Australia. They are *Orchard* 4213, 27.xi.1974, 37 km south of Dongara on coast track just south of Cliff Head, AK, PERTH (fl.); *Orchard* 4219, 27.xi.1974, 56 km south of Dongara on coast track, AK, PERTH (fl., fr.). As these are the first collections of the species since Drummond's type gathering, and the first to bear mature fruits, an amended description of the species is given below.

*Perennial herb or subshrub to 50 cm tall; stems woody at base, ascending, red to green, smooth or weakly 5-ribbed, sparsely scabrous with simple 2-4-celled, curved or slightly hooked hairs 0.2-0.4 mm long.*

*Leaves bright green, alternate, sessile, linear to linear-lanceolate, (1.5-) 3.0-4.5 cm long, 0.2-0.4(0.7) cm wide,  $\pm$  entire or minutely serrate with 4-8 teeth ca 1 mm long, mainly in upper part, sparsely scabrous with hairs as for stems, apex acute: all veins indistinct.*

*Inflorescence an indeterminate spike of 1-3-flowered dichasia in axils of alternate primary bracts. Lateral inflorescences arise in axils of upper leaves. Primary bracts broad-lanceolate, 0.9-1.4 cm long, (0.2-)0.4 mm wide, green, fleshy,  $\pm$  entire, midribbed, scabrous on margins; secondary bracts ovate, (1.7-)2.5-3.5 mm long, (0.4-)1.0-1.3 mm wide, green, fleshy, entire, strongly midribbed (almost keeled), glabrous but for a few scattered hairs on margins; tertiary bracts as for secondary, 2 mm long, tip attenuate.*

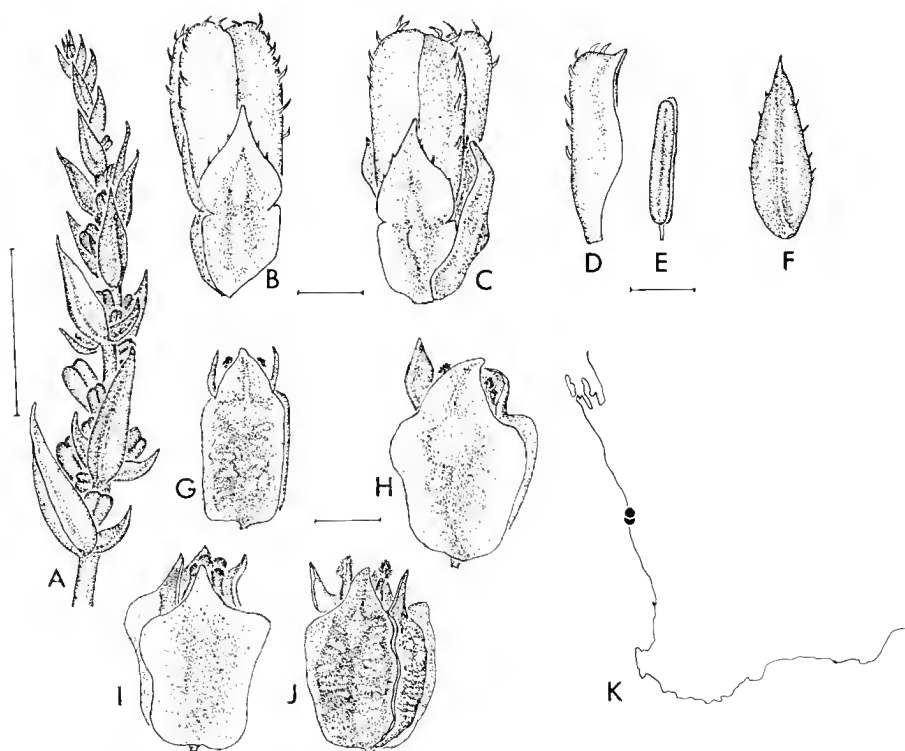


Figure 3—*Haloragis foliosa*. A. Upper part of inflorescence. B. Flower. C. Flower with secondary bract. D. Petal. E. Stamen. F. Secondary bract. G-J. Fruits. K. Distribution. (A-F. from Orchard 4213; G-J. from Orchard 4219.) Scales represent 1 cm (A.) or 1 mm (B-J.).

*Flowers* 4-merous, sessile. *Sepals* 4, ovate to subcordate, 1.3–1.9 mm long, 1.1–1.2 mm wide, weakly midribbed, otherwise smooth; tip very shortly acuminate; margin with a few curved hairs. *Petals* 4, hooded, keeled, very shortly unguiculate, 3.0–3.2 mm long, 0.9–1.3 mm wide (keel to margin), scabrous on keel. *Stamens* 8; filaments 0.1–0.3 mm long; anthers yellow, linear-oblong, 2.0–2.7 mm long, 0.3 mm wide, 4-locular, nonapiculate, anti-sepalous anthers ca 0.2 mm longer than antipetalous ones. *Styles* 4, clavate, 0.5–0.6 mm long; stigmas capitate. *Ovary* obpyramidal, 1.0–1.4 mm long, 0.8–1.0 mm wide, strongly 4-angled opposite petals, weakly ribbed opposite sepals, glabrous except for sparse hairs on ribs, 4-locular, with 1 pendulous ovule per locule.

*Fruit* oblong, 1.7–1.8 mm long, 1.2–1.3 mm wide (excluding wings), strongly 4-angled, with a narrow longitudinal wing on each angle, shallowly grooved opposite sepals, with faint horizontal ribs between grooves and wings, glabrous; wings 0.3 mm wide at top tapering to 0.1 mm at base; sepals persistent, erect, enclosing styles, deltoid, 0.8 mm long, 0.9 mm wide, faintly midribbed; 4-locules, 1 seed per locule.

Both of these new collections were rounded, multistemmed shrubs growing in shallow sand over limestone in low coastal heath. Both were in young flower in late November and one (*Orchard* 4219) still bore old fruits from the previous season. In their habit, habitat, leaf, flower and fruit morphology these plants very closely resemble *H. acutangula*, the fruits coming closest to *H. acutangula* f. *acutangula*. The main distinguishing characters between the two species are the sepals of the flowers (subcordate, 1.3–1.9 x 1.1–1.2 mm in *H. foliosa*; deltoid, 0.8–1.0 x 0.7–0.8 mm in *H. acutangula*), and the secondary bracts (fleshy and  $\pm$  keeled in *H. foliosa*; membranous and  $\pm$  lacking a midrib in *H. acutangula*). The hairs of the new collections are strongly curved in some parts, but lack the distinct sharply hooked tip of *H. aspera* and its allies.

The affinities of *H. foliosa* must now be considered to lie with *H. acutangula* rather than with *H. aspera* as suggested earlier. The relationship of *H. foliosa* to other members of this complex in Western Australia (*H. scoparia*, *H. aculeolata*) is still uncertain. Clarification must await further collections of all species involved.

## 20. *Haloragis hamata* Orchard.

Figure 4

Several more collections of this species have been made since its description, extending its known range northwards towards Norseman. The collections are *Orchard* 4436, 4438, 16.xii.1974, Near Young River ca 40 km directly north of the coast, AK, CANB, PERTH (fr.); *Orchard* 4439, 4440, 16.xii. 1974, Esperance-Norseman road ca 73 km south of Norseman, AK, CANB, PERTH (fl., fr.); *Orchard* 4442, 17.xii.1974, Esperance-Norseman road ca 50 km south of Norseman, AK, CANB, PERTH (fr.). The plants were locally abundant, particularly in roadside hollows and depressions, and seem to be confined to red sandy soils containing limestone nodules, always in inland localities. In these respects *H. hamata* differs from the superficially similar *H. digyna* which occurs nearby, but is so far recorded (in Western Australia) only from the deep white sand of coastal dunes (see below).

The fruits of these new collections differ slightly from those of previous gatherings. They are more or less depressed globose in shape, ca 1.4 mm long, 1.8 mm wide, with pronounced angles or thick rounded deltoid longitudinal wings alternating with the sepals, the sepals persistent, erect, deltoid, 0.9 mm long, 0.8 mm wide, smooth and glabrous. The body of the fruit between the

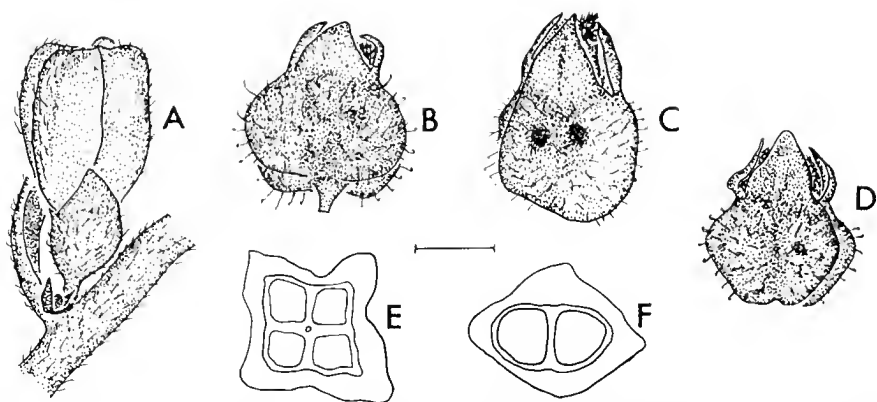


Figure 4—*Haloragis hamata*. A. Portion of inflorescence. B-D. Fruits. E. Transverse section of 4-locular fruit (fig. B). F. Transverse section of 2-locular fruit (fig. C). (A-C, E, F. from Orchard 4442; D. from Orchard 4438). Scale represents 1 mm (all figures).

angles or wings is weakly and irregularly verrucose, and the whole fruit, excluding the sepals, is densely scabrous with spreading hooked hairs. The fruit is 2-4-locular with a woody endocarp and septa, and a spongy exocarp.

#### 24. *Haloragis digyna* Labill.

Figure 5

Two further collections of this species suggest that changes are necessary in the previous treatment of the species (Orchard, 1975). The collections (Orchard 4444, 4445, 18.xii.1974, 5 km east of Esperance, AK, CANB, PERTH (fl., fr.)) came from white coastal sand-dunes, where the plants are locally abundant. In general appearance the plants resemble *H. hamata* but differ in being more or less glabrous, with only very few scattered curved or  $\pm$  hooked hairs. However, the main difference between the species lies in their fruits. In *H. digyna* the fruits are glabrous,  $\pm$  cylindric, 1.8-2.0 mm long, 1.0 mm wide, with 4 distinct angles alternating with the sepals, produced into narrow acute deltoid wings near the base, and strongly verrucose on the faces between the ribs. The sepals are persistent, erect,  $\pm$  ovate, 1.3 mm long, 0.8 mm wide, enclosing the styles. The fruit is 1-2-locular, with a woody endocarp and septa, and closely appressed, non-spongy exocarp.

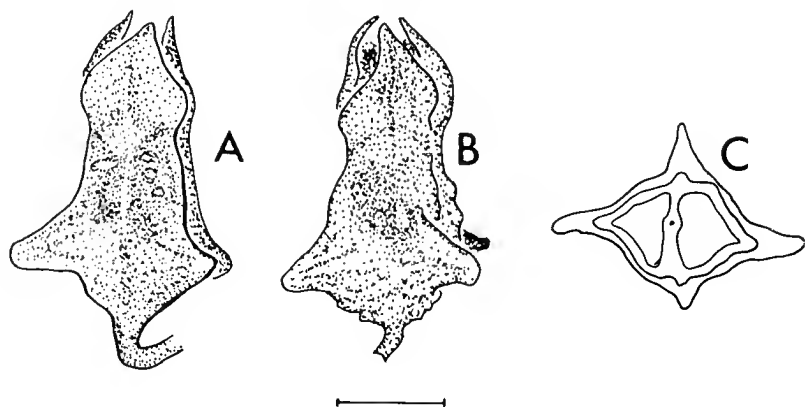


Figure 5—*Haloragis digyna*. A, B. Fruits. C. Transverse section of fruit. (all from Orchard 4445). Scale represents 1 mm.

Re-examination of the collections *Orchard* 1726 and 1728, formerly placed in *H. acutangula* f. *occidentalis*, has revealed that they are also *H. digyna*, and this casts doubt on the other Western Australian collections of *H. acutangula* f. *occidentalis*. Some of these, at least, have a fruit which differs from that described above, in that it is 4-lobular, with definite deltoid wings occupying the entire length of the fruit. Whether these collections should also be referred to *H. digyna* is a question which must be deferred until a more representative series of collections can be assembled from the entire southern coast of Western Australia. The specimens from South Australia cited under *H. acutangula* f. *occidentalis* definitely belong in *H. acutangula*, and will require a new name if the Western Australian members of this forma (including the type) are transferred to *H. digyna*.

The South Australian collections previously included in *H. digyna* (Orehard, 1975) differ from these new collections principally in habit, the South Australian plants being weak and herbaceous while the Esperance plants are erect and distinctly woody at the base. Further collections from Eyre Peninsula would be useful to help decide whether or not this difference is significant.

#### **Haloragis pedicellata** Schindler and **H. viridis** Schindler

These two species were inadvertently omitted from my previous treatment. Both were based on type specimens formerly in B, but subsequently lost. No duplicates of the types have been located, nor have any other collections ever been assigned to either of these species.

The first species, *H. pedicellata*, as described by Schindler differed from *H. exalata* mainly in its pedicellate flowers, and its serrate calyx lobes which lacked a median basal callus. The difference in length of flower pedicel is no longer a useful character now that more material of *H. exalata* is available, nor is the lack of a basal callus on the sepals. The remaining difference, the two teeth near the tips of the sepals in *H. pedicellata*, compared with the entire lobes in *H. exalata*, scarcely seems sufficient to keep the two species distinct. Pending the discovery of further material, it is probably best to include *H. pedicellata* in the synonymy of *H. exalata*.

*Haloragis viridis* does not seem (*ex descr.*) to differ in any significant manner from *H. stricta* R.Br. ex Benth., and is here included in this species.

### **HALORAGODENDRON**

#### **5. Haloragodendron glandulosum** Orehard

A further collection of this species from between Ravensthorpe and Southern Cross (*Newbey* 3469, 6.i.1971, Hatter's Hill, PERTH (fr.)) suggests that the plant may eventually prove to be widely distributed throughout the area approximately defined by the square Kalgoorlie-Southern Cross-Hopetoun-Esperance. This latest collection is described as "2 ft [60 cm] high in loam, dominant in some areas burnt 2 years ago".

### **GONOCARPUS**

#### **7. Gonocarpus sanguineus** (Merr. & Perry) Orchard

The collection *Armit* s.n., 1894, Mt. Dayman, MEL (fr.), not previously listed, represents the first known record of this plant, predating the next known collection (*Clemens* 102477) by 45 years.

### 8. *Gonocarpus halconensis* (Merr.) Orchard

The collection *MacGregor* s.n., 1894, lower ranges of British New Guinea, MEL (fl.), not previously listed, is the first known record of this plant. It predates the earliest Merrill collection from the Philippines (*Merrill* 5700), the type of *H. halconensis*, by 12 years.

### 13. *Gonocarpus implexus* Orchard

A further collection has been made of this species from the Kimberley region of Western Australia. The collection (*George* 12415, 19.viii.1974, Blyxa Creek, Prince Regent River Reserve, PERTH) was made in open woodland near the creek in sandy loam. It was cited by George & Kenneally (1975) as "*Haloragis* sp."

### 14. *Gonocarpus chinensis* (Lour.) Orchard subsp. *chinensis*

Another collection of this species has been made from the Kimberley region of Western Australia. The collection (*George* 12541, 22.viii.1974, Blyxa Creek, Prince Regent River Reserve, PERTH) was a straggling perennial herb growing in damp sand among open woodland of *Melaleuca viridiflora* and *Eucalyptus houseana*. It was cited by George & Kenneally (1975) as *Haloragis chinensis* (Lour.) Merrill, and noted as a new record for Western Australia. Fitzgerald had collected the same plant from three other localities in the Kimberleys in 1905, but the collections had not been identified as *G. chinensis* until my previous work.

### 20. *Gonocarpus leptothecus* (F. Muell.) Orchard

Figure 6

A number of new collections of this species from Western Australia and the Northern Territory have increased the known east-west range of the plant. In most cases, the collector's notes accompanying the specimens indicate that they were growing in sandstone soils, as was the case with most previous collections. The new collections are:

WESTERN AUSTRALIA: *George* 12450, 19.viii.1974, Blyxa Creek, Prince Regent River Reserve, PERTH; *Wilson* s.n., 27.v.1972, Champagne Island, Bonaparte Archipelago, PERTH (fr.); *Wilson* 10655, 12.v.1972, Augustus Island, Bonaparte Archipelago, PERTH (fr.); *Wilson* 10906, 22.v.1972, Heywood Island (south), Bonaparte Archipelago, PERTH (fr.); *Wilson* 11412, 7.vii.1973, Boongaree Island, Prince Frederick Harbour, PERTH (fl., fr.). NORTH-EASTERN TERRITORY: *Kanis & Schodde* 1822, 12.vi.1974, Upper Nicholson River area, China Wall, base camp on Fish River Gorge, CANB, AD (fr.).

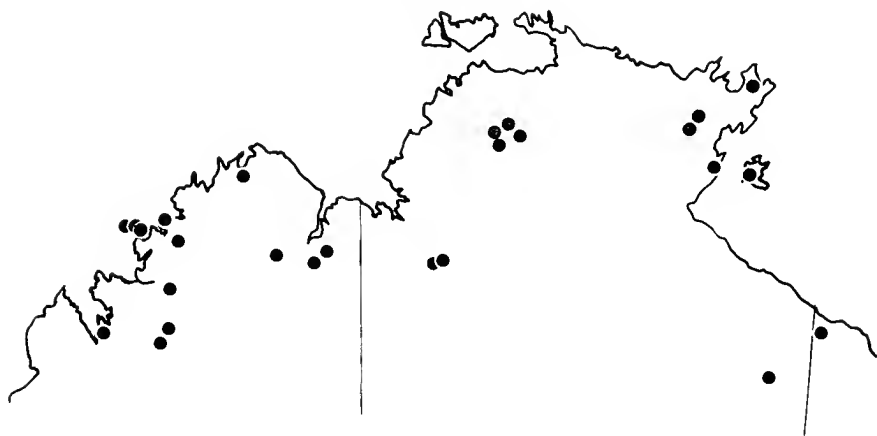


Figure 6—Distribution of *Gonocarpus leptothecus*.

## 21. *Gonocarpus benthamii* Orchard

Figure 7

In my previous treatment of this species the few specimens cited seemed to indicate that *G. benthamii* was a relatively rare plant, sporadic in its occurrence in south-western Western Australia. On the contrary, recent collections and observations show that it is plentiful in the understorey of Karri, Jarrah and Marri forests throughout the region south of Perth, and in some places where forestry management has eliminated most of the shrubby species, *G. benthamii* forms almost the entire understorey.

The new collections are:

*Orchard* 4323, 7.xii.1974, Big Brook, Bussell Highway, 5 km north of Margaret River township, AK, CANB, PERTH (fl.); *Orchard* 4332, 7.xii.1974, Margaret River at The Rapids, AK (fl.); *Orchard* 4339, 8.xii.1974, ca 8 km south-west of Alexandra Bridge on Kudardup Road, AK, CANB, PERTH (fl., fr.); *Orchard* 4361, 10.xii.1974, 15 km south-west of Pemberton on Yeagarup Road, AK, CANB, PERTH (fl.); *Orchard* 4363, 10.xii.1974, 7 km west of Shannon at corner of Middleton Road and Deeside Coast Road, AK, CANB, PERTH (fl.); *Orchard* 4368, 10.xii.1974, Shannon River at Lower Shannon Road crossing, AK, CANB, PERTH (fl.).



Figure 7— Distribution of *Gonocarpus benthamii*.

## 23. *Gonocarpus diffusus* (Diels) Orchard

Figure 8

Five further collections of this species have been made, significantly extending its known range. The collections are:

*Orchard* 4290, 4.xii.1974, 14 km by road from Dwellingup along North East Road, near the north-west corner of South Dandalup Dam, AK (fl., fr.); *Orchard* 4294, 5.xii.1974, north-east corner of Logue Brook Dam, AK (fl.); *Orchard* 4327, 7.xii.1974, Margaret River, along Canbrake Road, ca 18 km directly east-north-east of Margaret River township, AK (fl.); *Orchard* 4330, 7.xii.1974, Margaret River at The Rapids, AK (fl.); *Orchard* 4375, 11.xii.1974, 50 km north of Walpole on the Mt. Frankland road, AK, CANB (fl., fr.).

All of these plants were prostrate, very local in distribution, and always in close proximity to water. In fact, several were collected half submerged in shallow water, suggesting that intermittent flooding may be one of the ecological

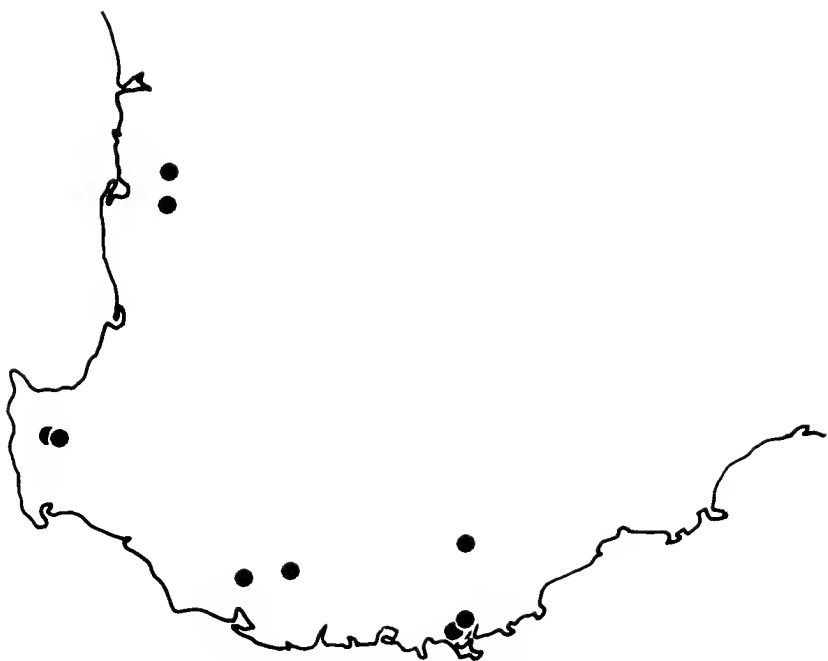


Figure 8—Distribution of *Gonocarpus diffusus*.

requirements of the species. Where this species occurs with *G. benthamii* (e.g. Orchard 4330, 4332), *G. diffusus* is found in the wetter areas. There are a number of minor differences between these recent collections and the description given previously. The stems are closely appressed pubescent, with unicellular hairs, particularly in the upper parts, becoming more or less glabrous towards the base. The leaves are moderately densely pilose on both faces, with hairs as for the stems. Many of the flower petals and anthers are much shorter than previously reported. The petals of apparently fully bisexual flowers can be as short as 0.8 mm, with anthers 0.4–0.5 mm long. The ovaries and fruits of these plants have, without exception, several short, thick, strongly curved hairs or papillae on the ribs, a feature previously (Orchard, 1975) described as “anomalous”. The discovery of these plants, and their differences from previous collections, casts doubts on whether *G. diffusus* and *G. intricatus* are really distinct. The only remaining differences between the species are the shape of the sepals (cordate in *G. intricatus*, deltoid-ovate and saccate in *G. diffusus*) and a slight difference in the size of the fruits. If the two species are merged in future, then the epithet “*intricatus*” has priority.

#### 24. *Gonocarpus rudis* (Benth.) Orchard

A further collection of this species has been made, providing further information on the habit and habitat requirements of *G. rudis*. The collection (Orchard 4415, 14.xii.1975, Stirling Range National Park, 2 km from Red Gum Pass road along Stirling Range Drive, AK, CANB, PERTH (fr.)) was a round subshrub, locally abundant, to 30 cm tall, softly reddish pubescent, growing in deep red sand on the roadside. Previous collections had given the impression that the plant was single-stemmed, with a “trunk” 5–10 cm tall arising from a fibrous rootstock, with numerous herbaceous branches borne near its apex. In fact, all plants in the population studied were multistemmed subshrubs, and the “trunks”, 20–30 in number, were only the primary branches, bearing

adventitious roots in their lower parts. Previous collections have shown considerable variation in fruit morphology. The fruits of *Orchard* 4415 are blackish purple, ovoid to globular, 0.8–0.9 mm long, 0.8–0.9 mm in diameter, 8-ribbed longitudinally, sparsely appressed pilose at the base and on the ribs; the sepals are persistent, erect, greenish-red, deltoid, 0.6–0.7 mm long, 0.5–0.6 mm wide, with a prominent median basal callus, and glabrous.

## 26. *Gonocarpus pusillus* (R.Br. ex Benth.) Orchard

Figure 9

This species was one of the most poorly known when the previous treatment of the genus went to press. It was known only from the type, of which I had seen only a fragmentary isotype from MEL. Two further collections which appear to belong here are now known, and are the basis for the amended description which appears below.

Prostrate annual *herbs* to 5 cm tall; *stems* to 10 cm long, spreading from central taproot, green, weakly 4-ribbed, glabrous. *Leaves* opposite at base, becoming alternate, linear to linear-lanceolate, 0.7–0.8 cm long, 0.1 cm wide, coriaceous, no veins apparent, glabrous.

*Inflorescence* an indeterminate spike of flowers borne singly in the axils of alternate primary bracts. Lateral inflorescences arise in axils of upper leaves. *Primary bracts* leaflike, lanceolate to ovate, (1.7–)2.0–2.5 mm long, 0.5–0.7 mm wide, coriaceous, glabrous. *Secondary bracts* green, fleshy to membranous, lanceolate, 0.5–1.2 mm long, 0.2–0.3 mm wide, often deciduous, glabrous or sparsely scabrous near tip with hairs 0.1 mm long.

*Flowers* 4-merous, on pedicels 0.1–0.2 mm long. *Sepals* 4, deltoid, 0.3 mm long, 0.3 mm wide, subsaccate at base, glabrous, margin thickened. *Petals* 4, yellow to reddish, hooded, keeled, unguiculate, 0.9–1.0 mm long, 0.3 mm wide (keel to margin), scabrous on keel with simple white unicellular hairs 0.1 mm long. *Stamens* 8; filaments 0.2 mm long; anthers red, oblong, 0.5–0.6 mm long, 0.2 mm wide, 4-locular, nonapiculate. *Styles* 4, clavate; stigmas red, fimbriate. *Ovary* silver-grey, ovoid to globular, 0.6–0.7 mm long, 0.6–0.7 mm wide, 8-ribbed, scabrous particularly on ribs and in lower part, with white unicellular appressed hairs; septa  $\pm$  absent; ovules 4 pendulous.

*Fruit* on pedicel 0.2–0.3 mm long, grey, ovoid to globular, 0.8 mm long, 0.8 mm wide, 8-ribbed, scabrous towards base and on ribs; sepals persistent, erect, green to purplish, deltoid, 0.3–0.4 mm long, 0.3–0.4 mm wide, glabrous, enclosing styles; 1 seed.

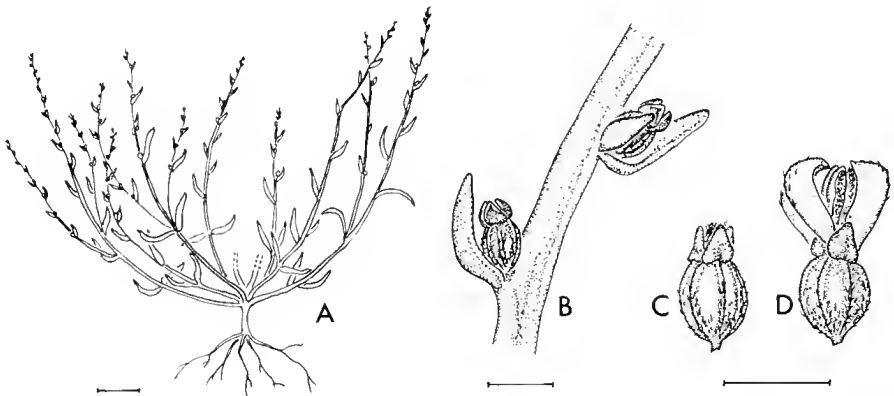


Figure 9—*Gonocarpus pusillus*. A. Habit. B. Flower. C. Portion of infructescence. D. Fruit. (All from Orchard 4371). Scales represent 1 cm (A.) or 1 mm (B–D.).

These collections (*Orchard* 4344, 8.xii.1974, Long Swamp ca 10 km directly north-east of Augusta, AK, CANB, PERTH (fl., fr.); *Orchard* 4371, 11.xii.1974, ca 3 km north of Mt. Frankland turnoff on Walpole-Mt. Frankland road, AK, CANB, PERTH (fl., fr.)) were found in low-lying restionaceous heath areas, probably subject to intermittent flooding in winter. The plants were inconspicuous but relatively abundant in these areas, growing in blackish sand, with Restionaceae, Epacridaceae, *Drosera* spp., *Thysanotus* spp. and *Gonocarpus paniculatus*. The two species of *Gonocarpus* are easily distinguished in the field. *G. pusillus* is prostrate with a relatively short, thick, green axis to the inflorescence, unbranched but for a few simple lateral inflorescences. *G. paniculatus* is a stiff, erect plant with profusely branched filiform reddish inflorescences. The leaves and flowers of *G. paniculatus* are also much larger than those of *G. pusillus*.

## 27. *Gonocarpus eremophilus* Orchard

One further collection of this species is now known: *George* 12175, 27.vii.1974, 53 miles [85 km] south-west of Warburton, Gibson Desert, PERTH (fl.). Like the earlier collections it was found on an open gravelly plain, associated with *Triodia basedowii*.

## 30. *Gonocarpus pithyoides* Nees

The three collections below considerably extend the known range of this species northwards:

*Orchard* 4258, 29.xi.1974, Gingin-Dongara road ca 4 km south of Mullering Brook, AK, CANB, PERTH (fl., fr.); *Orchard* 4259, 29.xi.1974, 6 km south of Dandaring West, AK, CANB, PERTH (fl., fr.); *Orchard* 4273, 1.xii.1974, 12 km west of Gingin-Dongara road along Moore River, AK, CANB, PERTH (fl., fr.).

## 31. *Gonocarpus simplex* (R.Br. ex Britten) Orchard

This species was previously known only from the type and a collection by C. P. Andrews, both from near Albany, and both lacking fruits. Even in this incomplete state it was clear that *G. simplex*, with its leafless, sedge-like stems and small flowers was an unusual member of the genus *Gonocarpus*. Two further collections of this species (*Orchard* 4443, 4443a, 17.xii.1974, access road to Cape Le Grand, ca 5 km north of National Park boundary, AK, CANB, PERTH (fl., fr.)) bearing a range of flowers and fruits, and one of them (*Orchard* 4443a) consisting of seedlings, have revealed that *G. simplex* differs from other *Gonocarpus* species in a number of other respects, and it is proposed that *G. simplex* should be segregated from the rest of the genus in a new section, *Gonocarpus* sect. *Simplum*, defined as follows.

## *Gonocarpus* section *Simplum* Orchard, sect. nov.

Styli subulati, sepala magnopere excedens; flores masculi in pedicellis longis elevatis; fructus lineares, longitudo ultra bis diametrum. Typus: *Gonocarpus simplex* (R.Br. ex Britten) Orchard.

The plants of this new section differ from those of *Gonocarpus* sect. *Gonocarpus* mainly in having long subulate styles greatly exceeding the sepals, in having male and bisexual flowers, probably on separate plants, with the male flowers borne on long pedicels, the bisexual flowers  $\pm$  sessile, and in having linear or cylindrical fruits more than twice as long as their diameter.

## Key to the sections of genus *Gonocarpus*

Styles clavate, not, or barely exceeding sepals; flowers all bisexual (or, rarely, functionally female), all  $\pm$  sessile; fruit ovoid, globular or shortly cylindrical, length (excluding sepals) less than twice diameter ..... sect. *Gonocarpus*  
 Styles subulate, greatly exceeding sepals; bisexual flowers  $\pm$  sessile, male flowers on long pedicels; fruit linear, length (excluding sepals) more than twice diameter ..... sect. *Simplum*

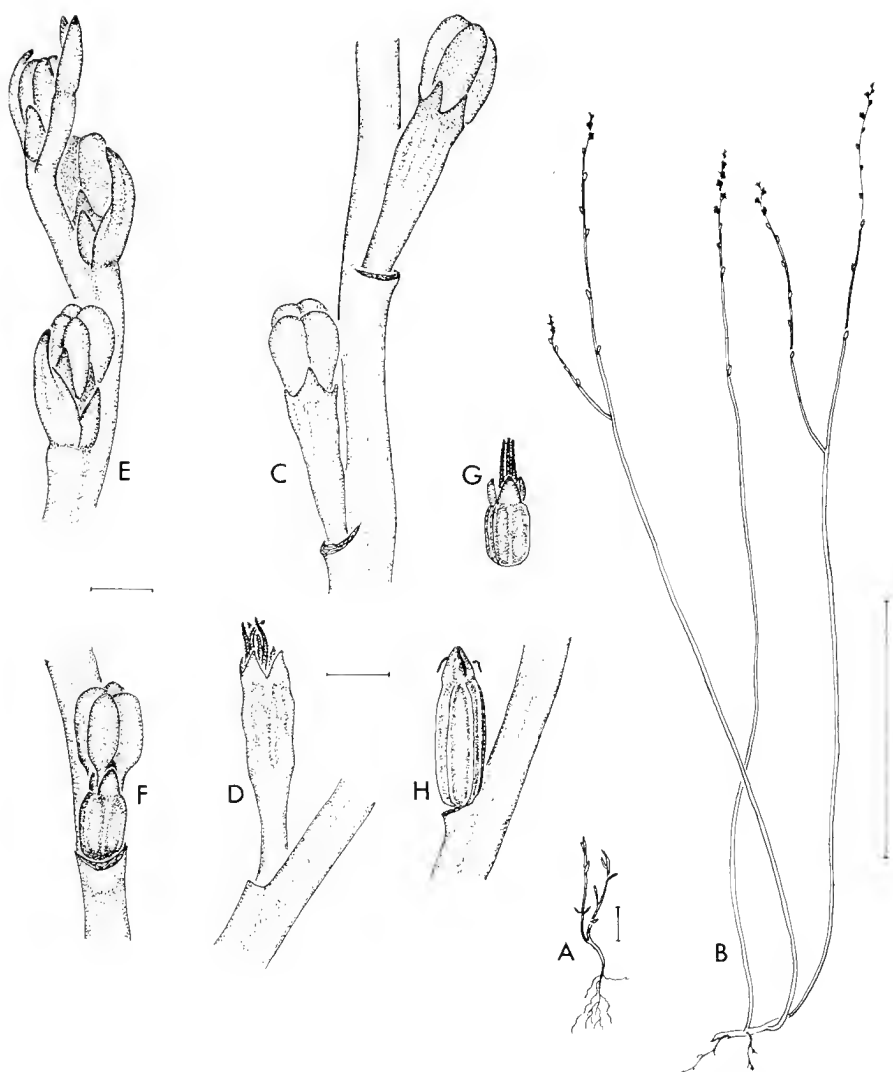


Figure 10—*Gonocarpus simplex*. A. Seedling. B. Habit of mature plant. C. Portion of male inflorescence, with primary bracts already shed. D. Male flower after shedding of petals and stamens. E. Tip of inflorescence showing bisexual flowers in axils of primary and secondary bracts. F. Bisexual flower. G. Bisexual flower after shedding of petals and stamens. H. Fruit. (A. from Orchard 4443a; B-H. from Orchard 4443). Scales represent 1 cm (A.), 10 cm (B.) and 1 mm (C-H.).

An amended description of *G. simplex* based on the two new collections is given below.

*Perennial herb* to 40 cm tall; rootstock stoloniferous; *stems* green, herbaceous,  $\pm$  leafless, sparsely branched, unribbed, glabrous. *Leaves* deciduous, alternate, linear, 0.5–1.0 cm long, 1 mm wide, glabrous; veins obscure apart from slight channelling above; tip with dark cap-like apiculum.

*Inflorescence* an indeterminate spike of flowers borne singly in axils of alternate primary bracts. Occasional lateral inflorescences are borne in the axils of the upper leaves. *Primary bracts* red, membranous, deltoid, 1.7 mm

long, 0.3 mm wide (keel to margin), conduplicately folded and stem-clasping, with well defined keel, glabrous, deciduous before anthesis. *Secondary bracts* linear, 0.8–1.1 mm long, 0.2 mm wide, glabrous, deciduous.

*Flowers* 4-merous; male or bisexual, apparently on distinct plants. *Bisexual flowers* sessile; *sepals* 4, deltoid, 0.4 mm long, 0.3 mm wide, glabrous. *Petals* 4, hooded, + keeled, 1.7 mm long, 0.3 mm wide, long-unguiculate (ca  $\frac{1}{4}$  of length), glabrous. *Stamens* 8; filaments 0.4 mm long; anthers linear-oblong, 0.9–1.0 mm long, 0.2 mm wide, 4-celled, nonapiculate. *Styles* 4, subulate, 0.8 mm long; stigmas fimbriate. *Ovary* linear-ovoid, 1.0 mm long, 0.4 mm diam., 8-ribbed, glabrous, incompletely 4-locular, 4 ovules. *Male flowers* as for bisexual ones, but on pedicel 2 mm long; ovary rudimentary.

*Fruit* green, sessile, linear-cylindrical, 1.8–1.9 mm long (excluding sepals), 0.6–0.7 mm wide, 8-ribbed, smooth between ribs, glabrous; sepals persistent, erect, deltoid, 0.4–0.5 mm long, 0.3–0.4 mm wide, smooth; styles protruding; 1 seed.

*Seedlings* with flexuose stems, first 2 leaves opposite, others alternate; stems and leaves bright green with reddish tips.

These two collections came from the margins of a small swamp, densely overgrown with Restionaceae, Cyperaceae and *Xyris*. The only associated trees were a few paperbark *Melaleuca* sp. The plants were relatively abundant, but inconspicuous, overtopped by sedges at the water's edge, particularly in disturbed places where the road crossed the swamp. The seedlings were numerous on a patch of black organic sand recently scraped clear of other vegetation. The swamp was some distance outside the boundary of Cape le Grand National Park, and a search of similar swamps inside the park failed to reveal *G. simplex*.

### 33. *Gonocarpus confertifolius* (F. Muell.) Orchard

A number of further collections of this species extend its known range.

*G. confertifolius* var. *confertifolius*: Boswell R29, 1967, Cundeelee, PERTH (fr.); Orchard 4196, 26.xi.1974, Kalbarri National Park, 9 km south-east of turnoff to The Loop, on main access road, AK, CANB, PERTH (fl., fr.).

*G. confertifolius* var. *helmsii* Orch.: Butler s.n., 26.i.1958, Queen Victoria Springs, PERTH (fl., fr.); Diels s.n., Menzies, PERTH (fl.); George 7987, 12.ix.1966, 19 miles [30 km] W. of Sandstone, PERTH (fl.); Orchard 4188, 24.xi.1974, 18 km west of Coolgardie on road to Southern Cross, AK, CANB, PERTH (fl., fr.); Orchard 4191, 24.xi.1974, 45 km west of Coolgardie on road to Southern Cross, AK, CANB, PERTH (fl., fr.); Orchard 4193, 24.xi.1974, 95 km west of Coolgardie, AK, CANB, PERTH (fl., fr.); Orchard 4195, 24.xi.1974, Merredin-Goomalling road, ca 2.5 km east of Trayning, AK, CANB, PERTH (fl., fr.).

The Orchard collection of var. *confertifolius* has leaves 1.0 cm long and 0.4–0.5 cm wide, with 6–8 teeth. These dimensions are considerably larger than those given previously.

*G. confertifolius* var. *helmsii*, of which only a few collections were known previously, is much more common than suspected. It is abundant in the area between Coolgardie and Southern Cross, particularly along the sides of the main road, in the shallow gutters.

### 35. *Gonocarpus paniculatus* (R.Br. ex Benth.) Orchard

Figure 11

Previous records of this species seem to indicate that it was fairly rare. Only a handful of collections were known, and very few of these were recent. However, it is now apparent that the species is in fact relatively common in the south-west of Western Australia, particularly in the coastal region between Margaret

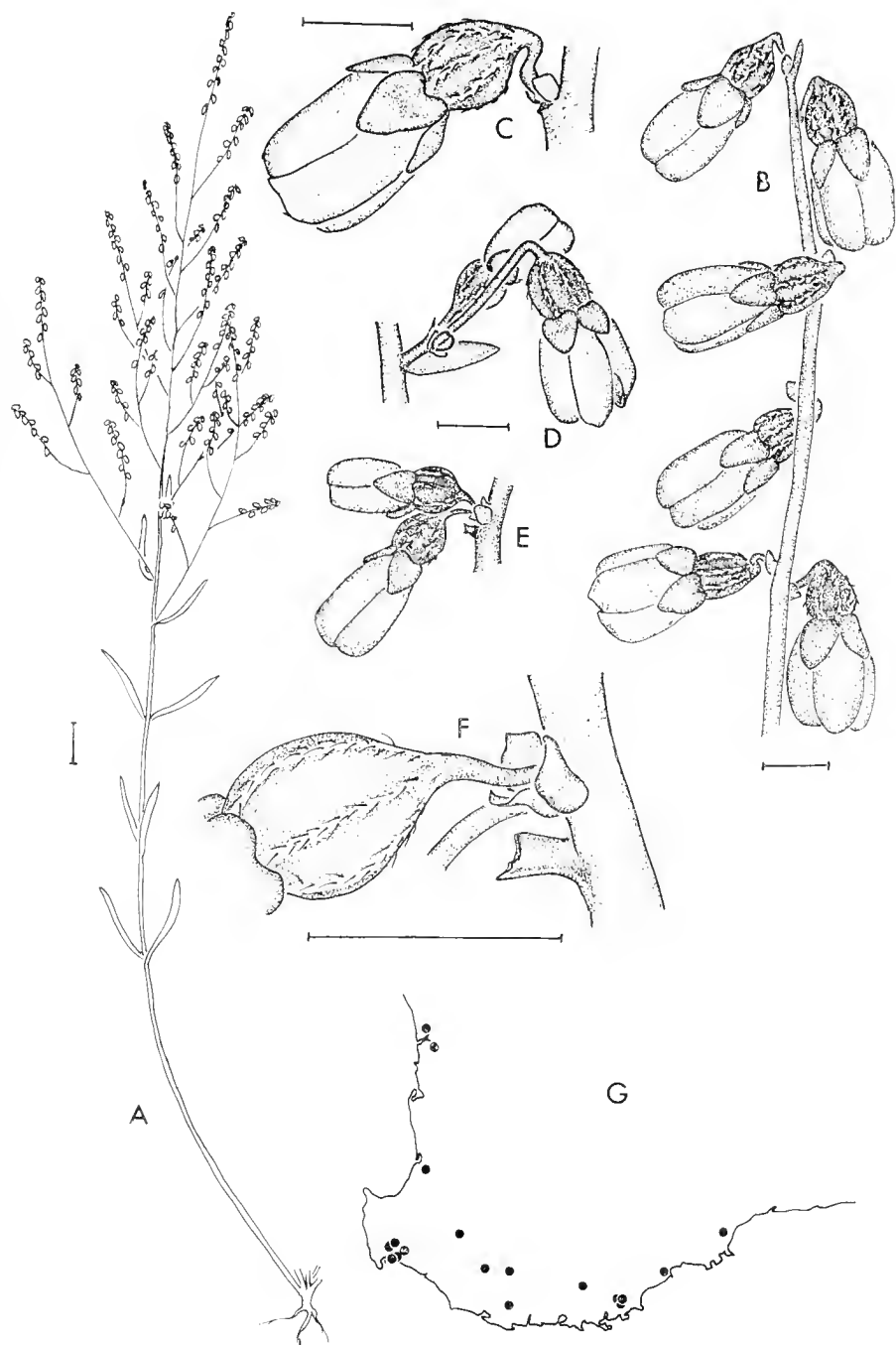


Figure 11—*Gonocarpus paniculatus*. A. Habit. B. Portion of inflorescence. C. Flower and secondary bracts. D-E. Flowers in fascicles of 3 and 2. F. As in E., but enlarged to show secondary and tertiary bracts. G. Distribution. (A-C. from Orchard 4422; D-F. from Orchard 4397). Scales represent 1 cm (A.), or 1 mm (B-F.).

River and Albany. It is found in lowlying areas, probably swampy in winter, usually on grey or blackish organic sands. In this type of habitat, *G. paniculatus* is usually abundant, but because of its delicate habit and dark coloration is easily overlooked. The collections cited below considerably increase the known range of the species.

Newbey 2394, 16.i.1966, 5 miles [8 km] NW, Cape Riche, PERTH (fl., fr.); Orchard 4340, 8.xii.1974, Long Swamp ca 10 km directly NE. of Augusta, AK, CANB, PERTH (fl.); Orchard 4345, 8.xii.1974, Scott River Road, ca 9 km SE. of Alexandra Bridge, AK, CANB, PERTH (fl.); Orchard 4346, 9.xii.1974, ca 25 km E. of Augusta on Canebrake Road 1 km N. of Scott River, AK, CANB, PERTH (fl.); Orchard 4349, 9.xii.1974, 30 km E. of Alexandra Bridge at corner of Canebrake Road and Stewart Road, AK, CANB, PERTH (fl.); Orchard 4373, 11.xii.1974, ca 3 km north of Mt. Frankland turnoff on Walpole-Mt. Frankland road, AK, CANB, PERTH (fl.); Orchard 4384, 11.xii.1974, 6 km south of Tonebridge, AK, CANB, PERTH (fl.); Orchard 4386, 11.xii.1974, 2 km north of Lake Unicum, AK, CANB, PERTH (fl.); Orchard 4394, 12.xii.1974, 9 km south of Mt. Barker on Albany Highway, AK, CANB, PERTH (fl.); Orchard 4397, 13.xii.1974, Palmdale Road ca 8 km west of Manypeak, AK, CANB, PERTH (fl.); Orchard 4398, 13.xii.1974, Lake Corinup north of Manypeak, AK (fl., fr.); Orchard 4399, 13.xii.1974, Lake Warburton Road ca 12 km north of Manypeak, AK, CANB, PERTH (fl., fr.); Orchard 4422, 15.xii.1974, Fitzgerald River National Park ca 12 km north of Qualup Homestead, AK, CANB, PERTH (fl.).

These collections also show that *G. paniculatus* is more variable than previously thought. The leaves range from terete to distinctly flattened and linear and the fruits vary in shape from ovoid to turbinate (occasionally depressed globose) and from densely pilose on the ribs to completely glabrous. All, however, comply with the key characters described earlier (Orchard, 1975). *G. paniculatus* is closely allied to *G. pusillus*, with which it is sometimes found in the field. See under the latter species for distinguishing characteristics.

### 36. *Gonocarpus hexandrus* (F. Muell.) Orchard

This anomalous and variable species had not been collected for over 50 years when my previous treatment went to press. Further collections have now been made, and it seems that the plant is not as rare as previously thought, at least so far as the subspecies *serratus* and *integrifolius* are concerned. Both are weak, multistemmed shrubs to 1 m tall, found invariably on the banks of streams, usually in reddish sandy clay. All were sterile or only in very young bud in December. Leaf shape and size was very variable, casting doubt on the validity of keeping these two subspecies distinct. The plants grouped under subspecies *integrifolius* have leaves varying from broadly lanceolate (3.0 x 1.0 cm) to linear (2.0 x 0.3 cm) and  $\pm$  entire to 4-5-serrate, the teeth being fine, almost hair-like, and up to ca 0.5 mm long. The four plants included in subspecies *serrata* have generally broader leaves, ovate, the lower ones 2.5-5.0 cm long, 1.0-1.2 cm wide, coarsely 6-8-serrate with distinctly deltoid teeth 2-3 mm long. While the plants of subsp. *integrifolius* were always glabrous (except for a few soft hairs on the new growth), the plants of one population of subsp. *serratus* were either glabrous (Orchard 4352) or scabrous (Orchard 4351). In this case the glabrous plants were in young bud, while the scabrous plants were all sterile (early December).

*Haloragis lanceolata* R.Br. ex Benth., tentatively placed in the synonymy of *G. hexandrus* subsp. *hexandrus* in my previous paper, may be better included in *G. pusillus*, as the description quite closely matches the new collections of the latter.

The new collections of *G. hexandrus* are as follows.

*G. hexandrus* subsp. *serratus* (Schindler) Orchard

Orchard 4350, 9.xii.1974, Barlee Brook at Barlee Road crossing, 25 km S. of Nannup, AK, CANB, PERTH (fl.); Orchard 4351, 4352, 9.xii.1974, Barlee Brook at Dickson (Tower) Road crossing, AK, CANB, PERTH (fl.); Orchard 4360, 10.xii.1974, 15 km south-west of Pemberton on Yeagarup Road, AK, CANB, PERTH (fl.).

*G. hexandrus* subsp. *integrifolius* (Schindler) Orchard

*Orchard* 4321, 4324, 7.xii.1974, Big Brook, Bussell Highway, 5 km north of Margaret River township, AK, CANB, PERTH (fl.); *Orchard* 4329, 7.xii.1974, Margaret River at The Rapids, AK, CANB, PERTH (st.); *Orchard* 4356, 10.xii.1974, ca 20 km SW. of Pemberton at Neanup Swamp, AK, CANB, PERTH (st.); *Orchard* 4389, 12.xii.1974, Amarillup Swamp, ca 25 km NNW. of Denmark, AK, CANB, PERTH (fl.).

### Acknowledgements

The Curators of the Western Australian Herbarium (PERTH) and Herbarium Australiense (CANB) kindly provided facilities for examining their collections. The patience of Mr Roy Pullen, who endured numerous detours in search of elusive Haloragaceae during a collecting trip in Western Australia in 1974, is much appreciated.

The field work was supported by an Australian Biological Resources Study Grant.

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## Studies in the genus *Acacia* (Mimosaceae)—6

### —Miscellany—

By B. R. Maslin

#### Abstract

Four new, phyllodinous, endemic, Western Australian species of *Acacia* are described: *A. curvata* sp. nov., *A. roycei* sp. nov., *A. sciophanes* sp. nov. and *A. sibina* sp. nov.

A full description of *A. aciphylla* Benth. is provided. In Western Australia this name has been misapplied to the species here described as *A. sibina*.

The new name, *A. tetanophylla*, is given to the taxon *A. triptycha* var. *pungens* E. Pritzel.

All species are illustrated and their distribution mapped.

#### Introduction

The six species dealt with in this paper are referable to Bentham's Series *Calamiformes*, *Juliflorae* and *Pungentes*. These Series will not be revised by me for some time but as it is desirable to have the species names available, I have decided to describe them now, prior to the revision.

The term *obloid* was introduced in a previous paper (Maslin 1975, p. 392). The term was originally used to describe flower heads but subsequently it has been found useful in describing other three-dimensional structures found in *Acacia*, especially seeds. Therefore, the original definition of the term *obloid* is here expanded to encompass any three dimensional structure, oblong in plane view (normally with round ends), whose length to width ratio ranges from 6:5 to 2:1.

In most cases only a small selection of specimens is cited under each taxon. A complete list of specimens seen is given at the end of this paper.

**1. *Acacia aciphylla* Benth.**, Linnaea 26:627 (1855). *Lectotype*: Swan River, Drummond IV:14 (K; iso: P, K, MEL, PERTH). *lecto. nov.*—Figure 1.

At the Western Australian Herbarium (PERTH) the name *A. aciphylla* Benth. has, in the past, been misapplied to specimens of the taxon described below (p. 155) as *A. sibina* Maslin sp. nov. Because of the confusion surrounding the name *A. aciphylla*, a description of this species is here provided.

Dense *shrub* to 1·3 m tall, dividing near ground level into many spreading to ascending branches; *bark* grey; *branches* terete, glabrous, normally red-brown towards apex; *new shoots* slightly resinous, light green. *Stipules* caducous. *Phyllodes* acicular, 60–120 (150–170) mm long, ca. 1 mm diam., decurrent (i.e. pulvinus absent, no articulation between phyllode base and branch), + rhombic in cross section (almost terete), ascending, rigid, glabrous (except on upper surface at extreme base where they are densely tomentose), light green to subglaucous; *apex* tapered into a straight, brown, pungent mucro; *nerves* numerous, close together, slightly raised, those on the four angles of the phyllodes slightly broader than the rest; *pulvinus* absent. *Gland* inconspicuous, situated ca. 1 mm above base of phyllode. *Inflorescences* simple, to 4 per node; *peduncles* 2–3 mm long, glabrous or puberulous; *receptacles* 3–5 mm long, glabrous or puberulous; *flower heads* obloid, 6–7 mm long just prior to anthesis. *Flowers* normally 5-merous; *calyx* 1/2–2/3 length of corolla, divided for 1/4–1/3 its length into ± oblong lobes, tube sparsely to moderately puberulous

towards base, obscurely 5-nerved; *petals* 2 mm long, glabrous, obscurely 1-nerved. *Legumes* linear, to 60 mm long and 2 mm wide,  $\pm$  coriaceous, brittle, raised over seeds, glabrous, greyish brown; *margins* not thickened, slightly contracted between seeds, yellow. *Seeds* (few seen) longitudinal in legume, obloid to ellipsoid, a little compressed, ca. 2.5 mm long, 1.8 mm wide, mottled,  $\pm$  light brown; *pleurogram* obscure, horseshoe-shaped, open towards the hilum; *areole* less than 0.5 mm long; *funicle* gradually thickened into a convoluted, translucent, yellow *aril*.

*Distribution*: (Figure 7) Western Australia: Not a particularly common species. Most collections of *A. aciphylla* have been made in the Tardun area (about 35 km southeast of Mullewa) but there is one gathering from between Pithara and Bindi Bindi (about 200 km south of Tardun). It is likely that future sampling of suitable habitats will reveal *A. aciphylla* in the intervening region between these two widely separated areas.

*Habitat*: This species has been collected in both yellow sand and red-brown rocky loam in dense "Wodjil" scrub (*Acacia-Melaleuca-Casuarina* association). It has also been found on lateritic hills.

*Flowering and fruiting period*: All the flowering specimens of *A. aciphylla* at hand were collected in late August. Judging from these specimens the flowering period would probably extend from late July to mid-September. Legumes with some mature seeds have been collected in late October.

*Selected specimens*: WESTERN AUSTRALIA:—8.5 mi (13.5 km) west of Canna, J. S. Beard 7211 (PERTH); Between Bindi Bindi and Pithara, W. E. Blackall 3638 (PERTH); 50 km from Mullewa towards Morawa, B. R. Maslin 3358 (CANB. K, NSW, NY, PERTH).

According to Bentham's classification (1864) *A. aciphylla* belongs to the *Juliflorae-Stenophyllae*. The species can be easily recognised by its characteristic phyllodes which are rigid, glabrous, multistriate, more or less rhombic in cross section, pungent, decurrent and which lack pulvini. These last two characters are very unusual but occur also in *A. longiphyllodinea* Maiden, the species most closely allied to *A. aciphylla*. The former species is readily distinguished from *A. aciphylla* by its pruinose branchlets, its longer, less rigid, coarsely pungent phyllodes (not as sharp as in *A. aciphylla*), and larger inflorescences and legumes.

Tindale (1972, p. 272) stated that *A. wanyu* Tindale is allied to *A. aciphylla* and *A. longiphyllodinea*. Although all these species are referable to Bentham's *Juliflorae-Stenophyllae* there is only a superficial resemblance between *A. wanyu* and the latter two. *Acacia wanyu* differs markedly from *A. aciphylla* and *A. longiphyllodinea* in its phyllode and legume morphology and may be distinguished from them by the following characters (parameters given in brackets refer to the latter two species): phyllodes hairy (glabrous), more slender, less pungent and most significantly possess a definite rugose basal pulvinus which is articulate on the branch (phyllodes decurrent and lack pulvini); inflorescence spikes less compact; calyx more deeply dissected; legumes 6–10 mm wide, moniliform, thickly coriaceous to woody, conspicuously wrinkled when dry (2–5 mm wide, flat but raised over seeds,  $\pm$  coriaceous to brittle but not woody, not wrinkled when dry); seeds 6–9 mm long and 3–4 mm wide (2.5–5 mm long, 1.8–3 mm wide).

Bentham (1855, p. 627) in his original description of *A. aciphylla* noted that perhaps *A. leptoneura* Benth. var. *pungens* Meisn. represented the same taxon as his new species. In 1864 (p. 399) Bentham treated the varietal epithet, *pungens*, as a synonym of *A. aciphylla* and listed the type of this variety (Preiss 976) among the specimens cited. However, Bentham noted that he had not seen the Preiss specimen. I have examined the types of both *A. aciphylla* and *A.*

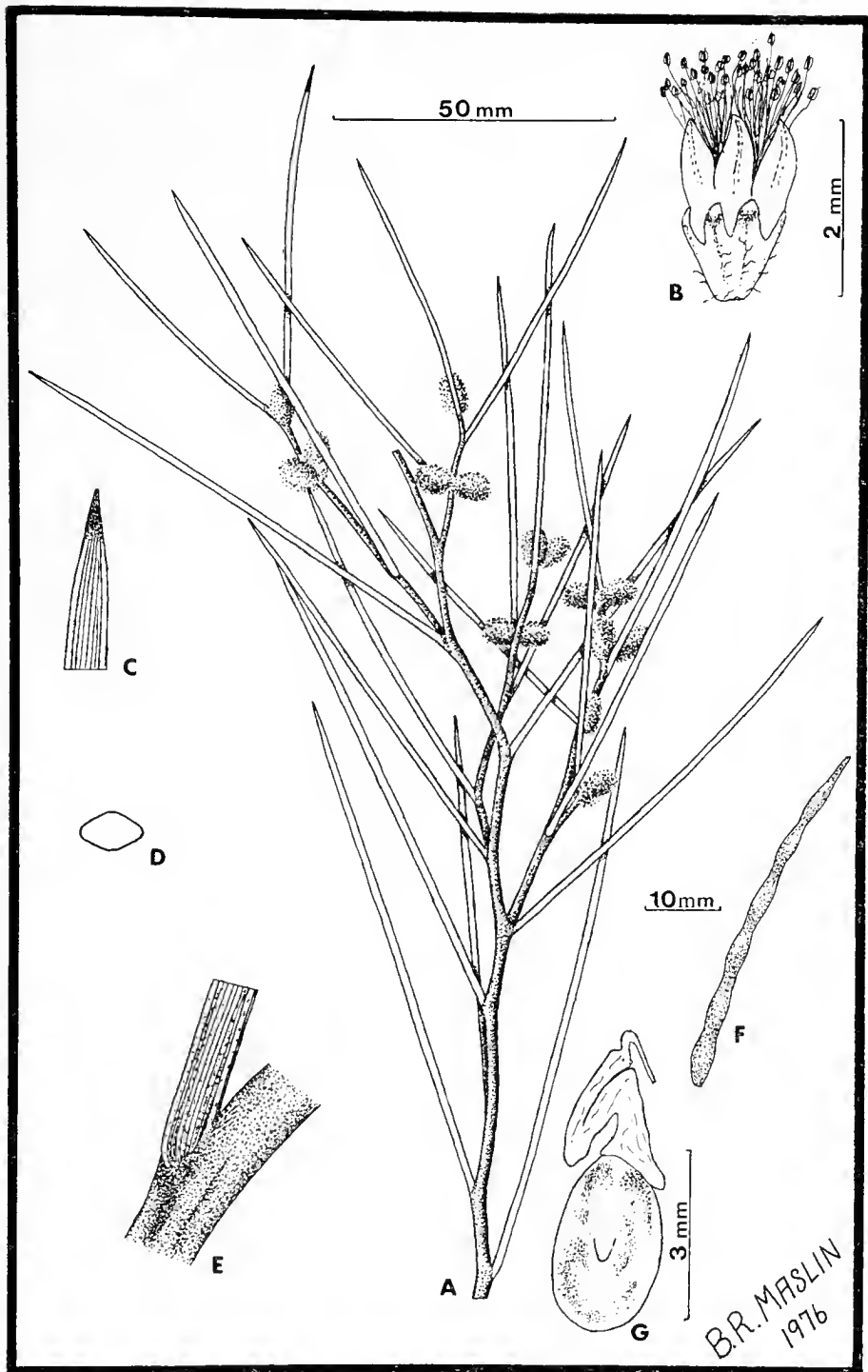


Figure 1—*Acacia aciphylla* Benth. A—Upper portion of branch showing 4 sessile, obloid flower heads. B—Flower. C—Phyllode apex. D—Phyllode in transverse section showing rhombic outline. E—Decurrent phyllode base (note absence of pulvinus). F—Legume (slightly immature). G—Seed (mottled).  
A from W. E. Blackall 3638; B-E from B. R. Maslin 3358; F-G from J. S. Beard 7211.

*leptoneura* var. *pungens* and it is clear that they represent different taxa of which the latter will be dealt with in a forthcoming publication.

Pritzel (1904, p. 306) described a variety, *A. aciphylla* Benth. var. *leptostachys*, and based it on *Diels* 4759. A portion of this type is at PERTH and it is clear that it represents the same taxon described by Maiden et Blakely (1927, p. 23) as *A. sessilispica*. Although *A. sessilispica* also occurs in the *Juliflorae-Stenophyllae*, it is not particularly closely related to *A. aciphylla*.

Based on a specimen collected by F. E. Victor from Kununoppin, Morrison (1912, p. 55) provided a description of legumes for the plant he believed to be *A. aciphylla*. I have not seen Victor's specimen but it is unlikely to be *A. aciphylla* because the legumes of this species do not accord with Morrison's description, i.e. they are not stipitate, their apices not hooked, and the funicle-aril is yellow (not white as described by Morrison). Also, there is no indication from the evidence available to date that *A. aciphylla* extends as far east as Kununoppin.

## 2. *Acacia curvata* Maslin sp. nov.—Figure 2.

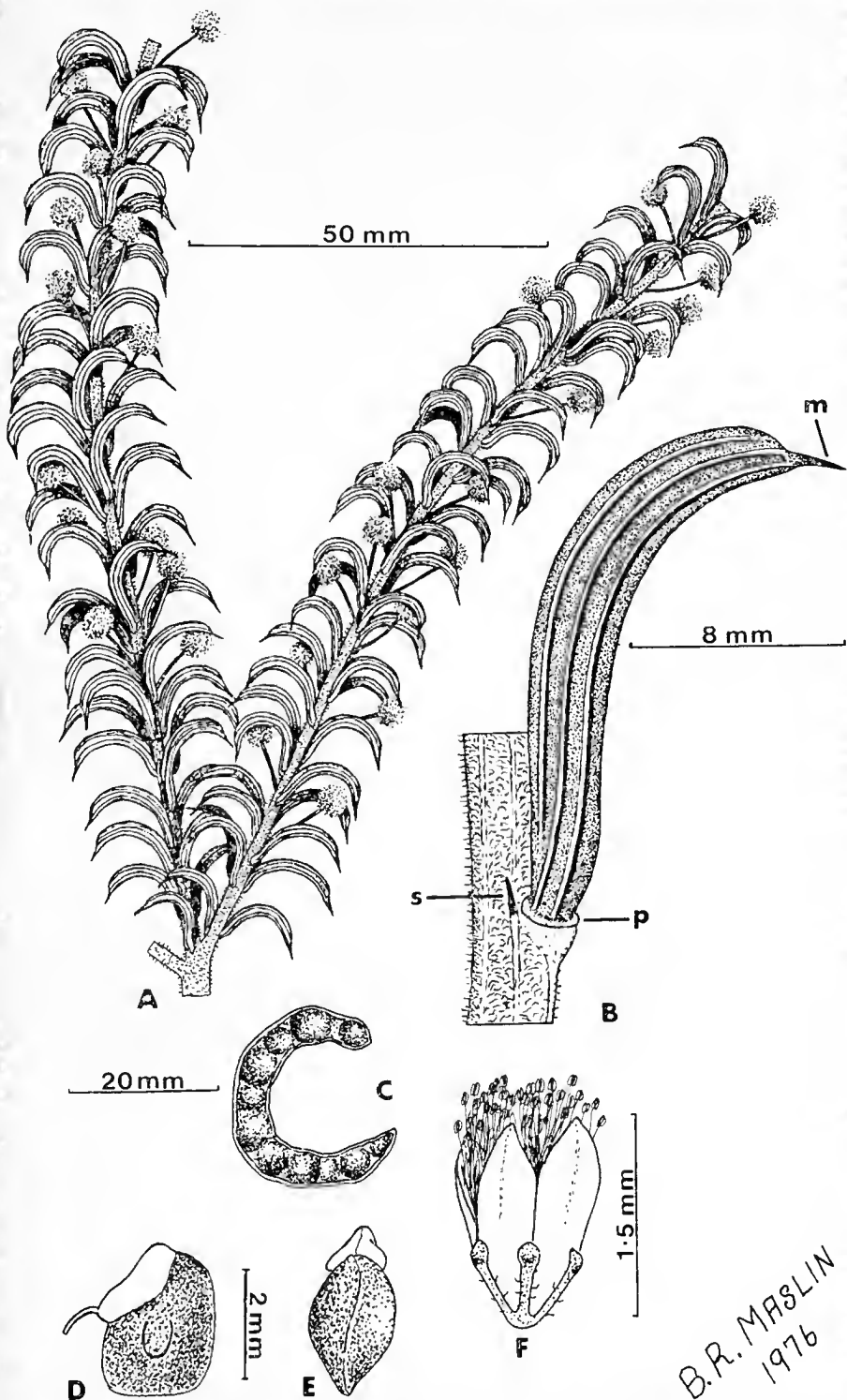
*Frutex* ramosissimus ad 1.3 m altus, ad ca. 3 m diam.; *ramuli* dense puberuli, demum glabra. *Stipulae* aliquantum caducae. *Phyllodia* acinaciforma, manifeste recurva, 10–20 mm longa, 1.5–3 mm lata, plana, glabra (surculi interdum puberuli), pungentia; utrinque 3-nervata, nervi discretis. *Glans* obscura, 0.5–7 mm supra pulvinum posita. *Inflorescentia* simplex; *pedunculi* 5–9 mm longis, glabris; *bracteae basales pedunculi* 1–1.5 mm longae, concavae, curvatae, acutae, ad basin dilatatae, fuscae; *capitula* aurea, globulosa, 13–25 floris. *Florae* 5-merae; *sepala* libera; *petala* glabra. *Legumen* ad 35 mm longum, 4–4.5 mm latum, curvum, planum, glabrum. *Semina* (fere matura) in legumine longitudinalia, late obloidea, 2.5 mm longa, turgida fusca.

Type: 5.5 mi (8.8 km) SE of Kundip, Western Australia, 24 July 1965, K. Newbey 1765 (holo: PERTH: iso: CANB, K, NY).

Harsh, much branched *shrub* to 1.3 m tall and ca. 3 m diam., diffuse and open when young but becoming dense and rounded with age, single-stemmed or branching at ground level; *bark* grey and fissured; *branchlets* terete, obscurely nerved, densely puberulous (becoming glabrous with age). *Stipules* somewhat caducous, normally narrowly triangular, 0.5–1 mm long, scarious. *Phyllodes* acinaciform, prominently recurved, 10–20 mm long, 1.5–3 mm wide, congested, flat, slightly thickened, rigid, glabrous (sometimes puberulous on new shoots), medium to olive green, base oblique; *nerves* 3 on each surface of phyllode, upper nerves sometimes not as pronounced as the central and lower ones, yellowish, prominently raised (when dry), not anastomosing, marginal nerves apparent but not thickened; *apex* narrowed into a subulate, pungent, straight, brown mucro 1–2 mm long; *pulvinus* very reduced (0.5 mm long), slightly dilated. *Gland* not prominent, situated on upper margin of phyllode 0.5–7 mm above pulvinus. *Inflorescences* simple, 1 (2) per node; *peduncles* 5–9 mm long (slightly longer when in fruit), glabrous; *basal peduncular bracts* solitary, 1–1.5 mm long, concave, curved, acute, dilated at base, normally puberulous, dark brown; *flower heads* golden yellow, globular, with 13–25 flowers. *Bracteoles* + oblong, ca. 0.5 mm long, laminae barely differentiated from claws. *Flowers* 5-merous; *sepals* ca. 1/2 length of petals, free to base, narrowly oblong but often slightly narrowed towards base, + keeled and inflexed at apex, normally sparsely puberulous, brown; *petals* 1–1.5 mm long, free, glabrous, yellow, obscurely 1-nerved; *ovary* tomentose. *Legumes* to 35 mm long, 4–4.5 mm wide, curved, firmly chartaceous and somewhat brittle, flat (not terete), slightly undulate, prominently raised over seeds (bulges prominent on alternate surfaces of legume), slightly shiny, glabrous, brown, abruptly

Figure 2—*Acacia curvata* sp. nov. A—Upper portion of the branch system. B—Node showing stipule (s) and recurved, 3-nerved phyllode with pungent mucro (m) and reduced pulvinus (p). C—Legume. D—Seed, nearly mature (side view). E—Seed, nearly mature (end view). F—Flower.

A–B from H. E. Knox 8; C–E from B. R. Maslin 2527; F from K. Newbey 1765 (the Type).



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contracted at apex, basal stipe absent; *margins*  $\pm$  thickened, barely contracted between seeds. *Seeds* (nearly mature) longitudinal in legume, broadly obloid,  $\pm$  2.5 mm long, turgid, narrowed towards periphery, dark brown, slightly shiny; *pleurogram* horseshoe-shaped, open towards the hilum, obscure; *areole* ca. 0.5 mm long; *funicle* filiform, ca. 1 mm long, abruptly expanded into a thickened straight (not folded) obliquely situated *aril*.

*Distribution*: (Figure 7) Western Australia: Sporadic in southern regions from near Ravensthorpe east to Wittenoom Hills (about 50 km NE of Esperance).

*Habitat*: Clay, clay-loam or lateritic gravel.

*Flowering period*: Most collections in flower were gathered from May to July, but one flowering specimen seen was collected in December.

*Fruiting period*: Legumes with near-mature seeds have been collected in December.

*Selected specimens*: WESTERN AUSTRALIA:—Wittenoom Hills, 9 June 1972, T. Daniels s.n. (PERTH); South of Ravensthorpe, A.S. George 4422 (MEL, NSW, PERTH); Near Scaddan, H. E. Knox 8 (PERTH); Approximately 20 km due SW of Scaddan, B. R. Maslin 2527 (PERTH).

Using Bentham's classification (1864) *A. curvata* should be placed in the *Pungentes-Plurinerves*, but it is not particularly closely related to the other members of this group. In its general phyllode morphology *A. curvata* superficially resembles *A. campylophylla* Benth. but is readily distinguished from that species by its puberulous branchlets, reduced pulvinus which is articulate on the branch (in *A. campylophylla* the pulvinus is lacking and the lower margin of the phyllode is continuous with the branch rib), smaller bracteoles and flower heads, and curved, less chartaceous legumes. *Acacia curvata* has some affinities with *A. latipes* Benth. but its prominently recurved phyllodes with reduced pulvini readily distinguish it from that species (*Acacia latipes* has straighter phyllodes which lack pulvini).

The specific epithet refers to the characteristic recurved phyllodes.

### 3. *Acacia roycei* Maslin sp. nov.—Figure 3.

*Frutex* vel *arbor parva* ad 3.5 m altus, densiuscula, odorata; *ramuli* teretes, saepe ad apicem minute sericei sed deinde glabri. *Phyllodia* acicularia, 40–75 mm longa, 1 mm diam. teretia, ascendentia, rigida, recta ad leviter curvata, subtiliter striata, inter venium minute sericeum sed deinde glabrum, pungentia. *Glans* saepe obscura, 5–17 mm supra pulvinum, raro etiam glande altera 50 mm supra pulvinum posita. *Inflorescentia* simplex; *pedunculi* 8–12 mm longi; *capitula* lutea, globulosa, 55–75 floribus. *Florae* 5-merae (raro 6-merae); *sepala* fere ad basin irregulariter lobata; *petala* glabra. *Legumen* curvum, plerumque ad ca. 50 mm longum, 4–5 mm latum, chartaceum, glabrum. *Semina* (immatura) in legumine longitudinalia.

*Type*: About 6 km W of Overlander-Denham road towards Tamala, Shark Bay area, Western Australia, 6 Aug. 1974, B. R. Maslin 3680 (holo: PERTH; iso: B, CANB, K, MEL, NSW, NY, PERTH).

Rather dense, fragrant *shrub* or *small tree* to 3.3 m tall, either single-stemmed or dividing at ground level into many spreading-erect branches; *new shoots* densely appressed-puberulous (hairs pale yellow); *bark* grey, fissured on main trunks, smooth on branches; *branchlets* terete, very obscurely nerved, red-brown but with a light grey longitudinally fissured epidermis, often minutely sericeous at apex but becoming glabrous with age. *Stipules* triangular to very narrowly triangular, more or less caducous (the thickened bases remaining after the scarious laminae have fallen). *Phyllodes* acicular, 40–75 mm long, 1 mm diameter, terete (circular in cross section), slightly narrowed near base, ascending, rigid, straight to slightly curved, minutely sericeous between nerves but becoming glabrous with age, green to greyish green, finely multistriate

(lamina sometimes slightly depressed between nerves—when dry); *apex* narrowed into a straight, subulate, pungent, brown mucro ca. 2 mm long; *pulvinus* 0.5–1 mm long, slightly dilated, smooth, yellow. *Gland* often obscure, situated on upper surface of phyllode 5–17 mm above pulvinus, rarely an additional gland above middle of phyllode (ca. 50 mm above pulvinus). *In-florescences* simple, 1–2 per node; *peduncles* 8–12 mm long, sparsely to moderately minutely antrorsely hairy; *basal peduncular bracts* rather caducous; *flower heads* bright medium yellow, glohular, with 55–75 rather densely packed flowers. *Bracteoles* ca. 1 mm long, sparsely puberulous; *claws* narrowly oblong or narrowed towards base; *laminae*  $\pm$  ovate, keeled, light brown. *Flowers* 5-merous (rarely a few flowers in the head 6-merous); *sepals* ca. 1/2 length of petals, irregularly divided almost to base into narrowly oblong or slightly spatulate sparsely puberulous lobes; *petals* 1.5–2 mm long, connate for 3/4 their length, glabrous, obscurely 1-nerved; *ovary* glabrous or sparsely papillose. *Legumes* narrowly oblong, curved, normally to ca. 50 mm long, 4–5 mm wide, chartaceous, flat but raised over seeds, glabrous, light brown to yellowish brown,  $\pm$  abruptly narrowed at both ends; *margins* barely thickened, normally slightly contracted between seeds. *Seeds* (immature) longitudinal in legume; *funicle* oblong and very short, abruptly expanded into a large bright yellow *aril* which is obliquely positioned on seed.

*Distribution:* (Figure 7) Western Australia: Occurring in an area from the vicinity of Nerren Nerren Station (90 km N of Murchison River on North West Coastal Highway) NNW to near Nilemah Station in the Shark Bay district.

*Habitat:* Beard (1976) states that the topography in which this species\* occurs is very uniform and consists of red sandplain with slight undulations. The vegetation is an *Acacia-Casuarina* thicket with occasional emergent low trees and a ground layer of smaller shrubs. I have made a number of collections of *A. roycei* and found it growing in red-brown to light brown loam or yellow sand in Closed-scrub with *A. longispinea* A. Morrison, *A. wiseana* C. A. Gardner (occasionally *A. ranulosa* W. V. Fitzg.), *Banksia ashbyi* Bak. f. and *Eucalyptus roycei* Carr, Carr et George.

*Flowering Period:* August–October.

*Fruiting period:* Legumes with mature seeds have not been seen. Judging from the one specimen available with immature fruits, ripe seed would be found in about mid-November.

*Selected specimens:* WESTERN AUSTRALIA:—East of Nerren Nerren, J. S. Beard 7115 (PERTH); Hamelin Pool, W. E. Blackall 546 (PERTH); 36 km S of Overlander Roadhouse on North West Coastal Highway, B. R. Maslin 2780 (CANB, K, PERTH); 22.5 km S of Billabong Roadhouse towards Geraldton, North West Coastal Highway, B. R. Maslin 3719 (BRI, PERTH).

Using Bentham's classification (1864) *A. roycei* should be placed in the *Pungentes-Plurinerves*, but it is not closely related to the other members of this group. *Acacia roycei* is readily recognised by a combination of characters, viz. rigid, acicular, long-mucronate phyllodes, and globular, pedunculate flower heads each bearing over 50 flowers.

At the Western Australian Herbarium *A. roycei* has in the past been referred either to an undescribed variety of *A. leptoneura* Benth. or to *A. triptycha* var. *tenuis* Maiden ( = *A. fragilis* Maiden et Blakely). However, it is not closely related to either of these taxa.

The species is named in honour of Mr Robert Dunlop Royce, Curator of the Western Australian Herbarium from 1960 until his retirement in 1974.

\* *Acacia roycei* is referred to in Beard's work as "*A. sp. inedit.* (JSB 7115)".

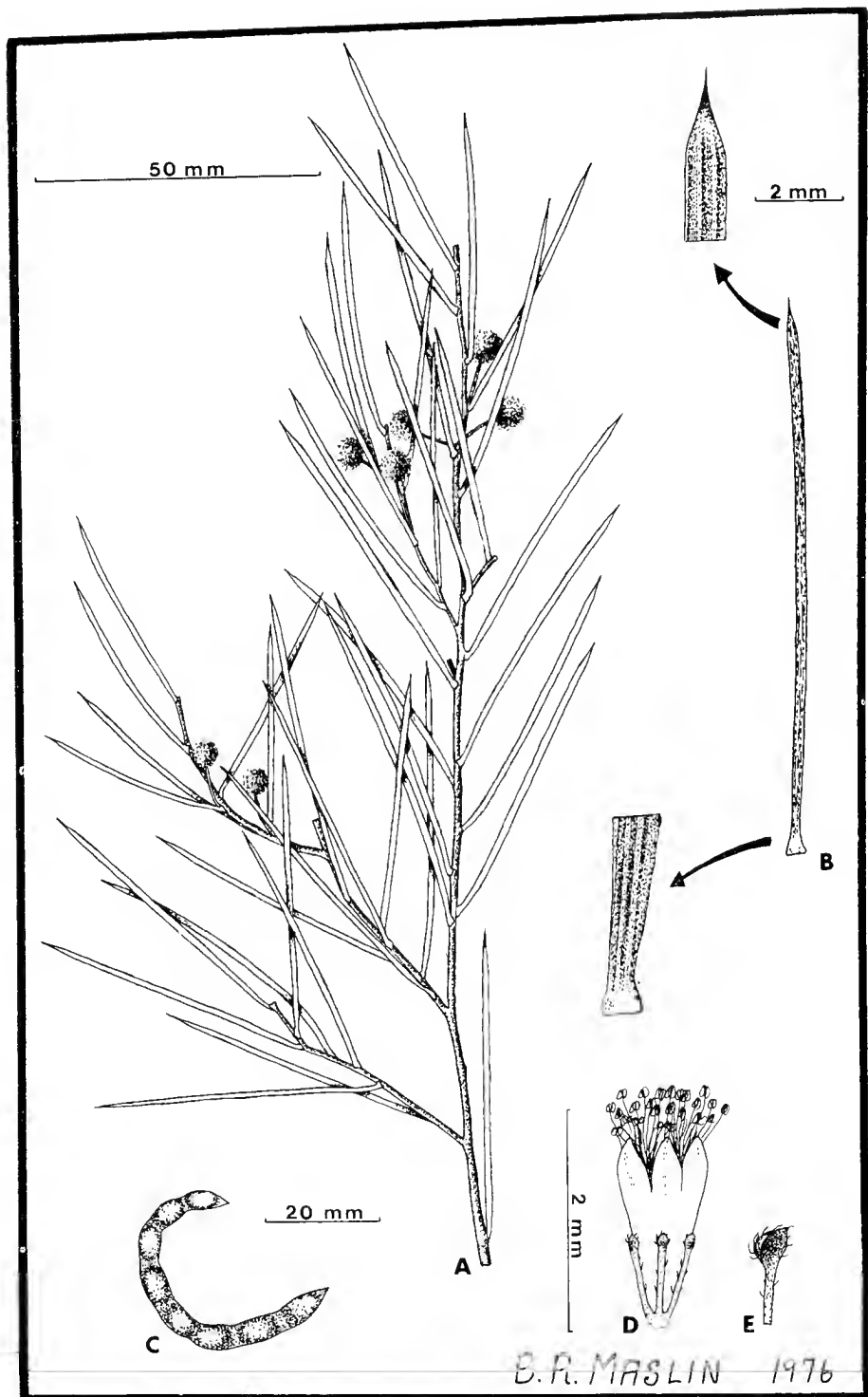


Figure 3—*Acacia roycei* sp. nov. A—Upper portion of branch. B—Phyllode (with insets of base and apex). C—Legume valve. D—Flower. E—Bracteole. All from B. R. Maslin 3680 (the Type).

#### 4. *Acacia sciophanes* Maslin sp. nov.—Figure 4.

*Frutex* ad 2·3 m alta, diffusa, exilis; *rami* plerumque penduli flexuosi, glabri ad strigillisi. *Stipulae* caducae. *Phyllodia* linearia, 90–150 mm longa, 102 mm lata, + curvata, in sectione transversali + circularia ad quadrangularia, manifeste 4-costata (*costis* sulcisque alternantibus). *Glands* 1–2 mm supra pulvinum posita. *Inflorescentia* simplex; *pedunculi* 5–6 mm longi; *capitula* lutea, globulosa, 25–31 floribus. *Florae* 5-merae; *calyx* breviter triangulari-lobatus; *petala* glabra. *Legumen* lineare, ad 100 mm longum, 102 mm latum, + terete. *Semina* in legumine longitudinalia, obliodea ad ellipsoidea, 3·3–5 x 1·5 mm, maculata.

*Type*: 15 km west of Mukinbudin towards Welbungin, Western Australia, 13 Oct. 1975, B. R. Maslin 3970 (holo: PERTH; iso: AD, B, BM, BRI, CANB, G, K, MEL, NSW, NY, P, PERTH, US).

Diffuse, openly branched, wispy *shrub* to 2·3 m tall, dividing near ground level (or to 0·6 m above) into a number of main trunks; *bark* light grey, smooth but finely fissured at extreme base of trunk; *branches* mostly pendulous, flexuose, terete (but ribbed towards apex), slightly resinous, glabrous to strigillose, light brown towards apex but red-brown with a light grey peeling epidermis with age. *Stipules* caducous. *Phyllodes* coarsely filiform, 90–150 mm long, 1–2 mm wide, + curved, spreading, very slightly resinous, slightly laterally compressed, prominently 4-ribbed (ribs alternating with 4 equally prominent grooves), ribs yellowish and glabrous, grooves concave subglaucous and glabrous or strigillose; *apex* straight or uncinat, not pungent, brown; *pulvinus* 1–2 mm long, obscurely wrinkled, glabrescent. *Gland* situated on upper rib of phyllode 1–2 mm above pulvinus, lamina tissue slightly swollen around gland, orifice distinct (oblong, ± 0·5 mm long), lip indistinct. *Inflorescences* simple, normally arising from near base of new shoot, 1–2 per axil; *peduncles* 5–6 mm long, slightly longitudinally sulcate (when dry), glabrous, or strigose at base, resinous; *basal peduncular bracts* caducous, solitary, ± triangular, + 1 mm long; *receptacles* slightly obloid, glabrous, *flower heads* bright yellow, globular, with 25–31 ± loosely arranged flowers. *Bracteoles* ca. 0·5 mm long (calyx in length); *claws* linear; *laminae* ovate, puberulous, slightly keeled. *Flowers* 5-merous, slightly resinous; *calyx* 1/4 length of corolla, very shallowly divided (for ca. 1/6 its length) into broadly triangular ciliolate lobes, tube sparsely puberulous and nerveless; *petals* 2–2·5 mm long, connate for 2/3 their length, not reflexed at anthesis, glabrous, very obscurely 1-nerved; *ovary* very shortly stipitate, densely tomentose. *Legumes* linear, to 100 mm long, 1–2 mm wide, + terete, sometimes twisted, firmly chartaceous, silvery-strigillose; *margins* slightly contracted between seeds (indentations shallowly concave); *marginal nerves* scarcely thickened, broad, glabrous, yellowish. *Seeds* longitudinal in legume, obloid to ellipsoid, 3·3–5 x 1·5 mm, slightly compressed, mottled, a dark brown line extending around periphery, slightly shiny; *pleurogram* 'u'- to 'v'-shaped, open towards the hilum, obscure; *areole* 0·3–0·4 mm long; *funicle* convoluted, expanded into a pileiform white *aril*.

*Distribution*: (Figure 7) Western Australia: Known only from between Mukinbudin and Bencubbin.

*Habitat*: Yellow sand in tall dense sandplain scrub with *Acacia longispinea* A. Morrison, *A. resinomarginea* W. V. Fitzg., *A. signata* F. Muell. and *Casuarina acutivalvis* F. Muell.

*Flowering period*: The specimens at hand are all in flower and were collected from late September to mid-October. Judging from these it is likely that the flowering period would extend from mid-September to November.

*Fruiting period*: As with *A. anfractuosa* Maslin (see discussion below) the previous year's legumes are present on *A. sciophanes* during the next flowering season. Only one collection of specimens with legumes has been made and this was gathered in mid-October. These legumes contained some mature seeds.

*Selected specimens:* WESTERN AUSTRALIA:—Near Mukinbudin, 80 km N of Merredin, W. E. Blackall 848 (PERTH); West of Welbungin, C. A. Gardner 2754 (PERTH).

Using Bentham's classification (1864) *A. sciophanes* should be placed in the *Calamiformes-Uninerves*, but it is not related to the other members of this

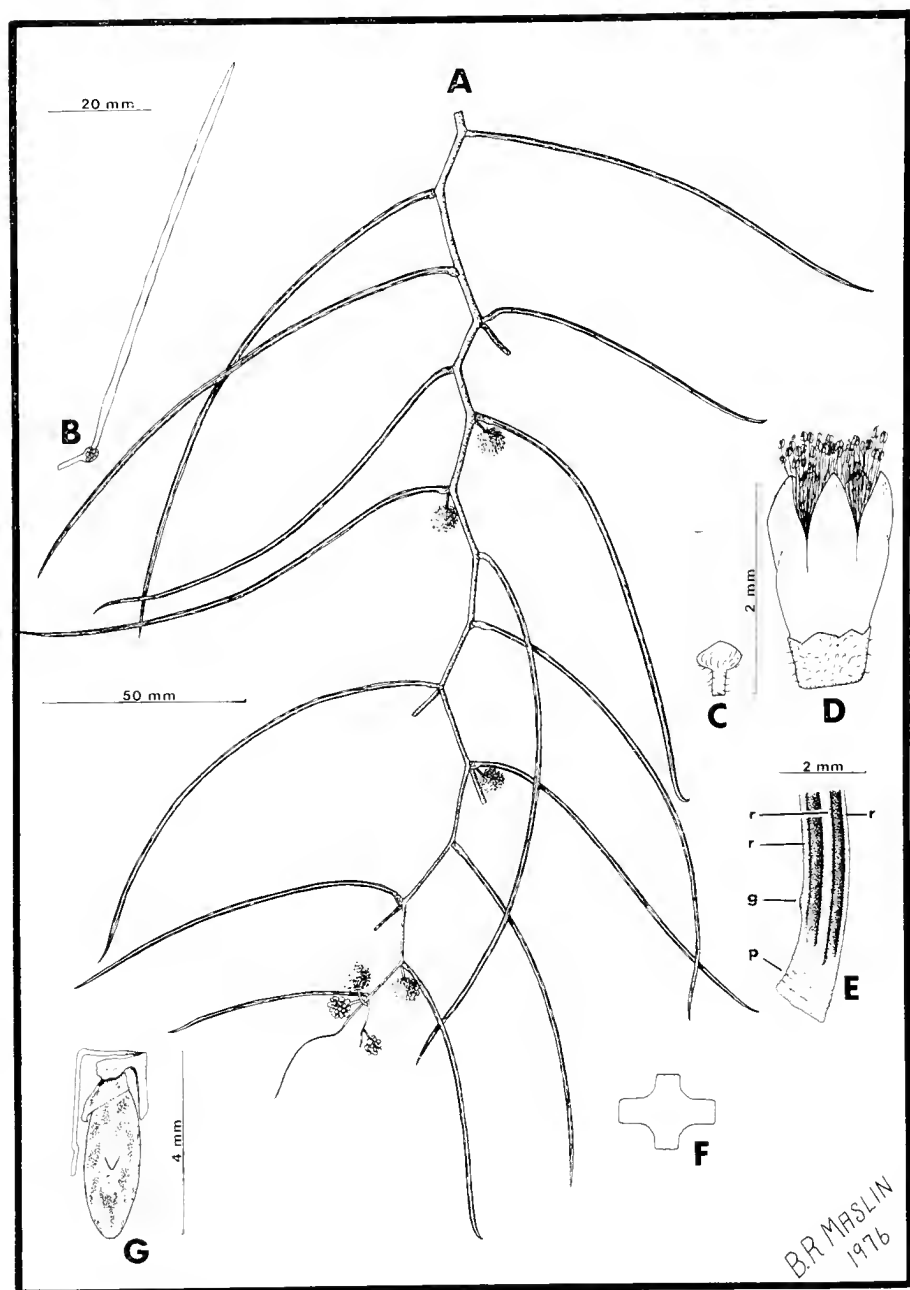


Figure 4—*Acacia sciophanes* sp. nov. A—Upper portion of branch showing pendulous habit. B—Legume (attached to receptacle). C—Bracteole. D—Flower. E—Phyllode base showing prominent ribs (r), obscurely wrinkled pulvinus (p) and gland (g). F—Phyllode in traverse section showing quadrangular outline. G—Seed (mottled). A, B, E-G from B. R. Maslin 3970 (the Type); C-D from C. A. Gardner 2754.

group. *Acacia sciophanes* has its true affinities with *A. anfractuosa* Maslin, another species which is difficult to fit into Bentham's classification (Maslin 1976, p. 97). These two taxa share the same distinctive wispy growth habit and have pendulous, flexuose branches, they also have similar inflorescence and legume characters. The main difference between them lies in the nature of their phyllodes. In *A. sciophanes* the phyllodes are more or less circular to quadrangular in cross-section and have four, equally spaced longitudinal ribs (alternating with four equally prominent grooves) running the entire length of the phyllodes. *Acacia anfractuosa* on the other hand has phyllodes which are either  $\pm$  flat or rhomboidal in cross-section and which have 3–7 nerves on each face. The known distributions of the two species do not overlap.

The variant of *A. anfractuosa* from between Mukinbudin and Welbungin referred to previously by me is *A. sciophanes* (Maslin, 1976 p. 98).

The specific epithet refers to the growth habit which is very diffuse and open imparting a phantom-like appearance to this species when seen from a distance.

## 5. *Acacia sibina* Maslin sp. nov.—Figure 5.

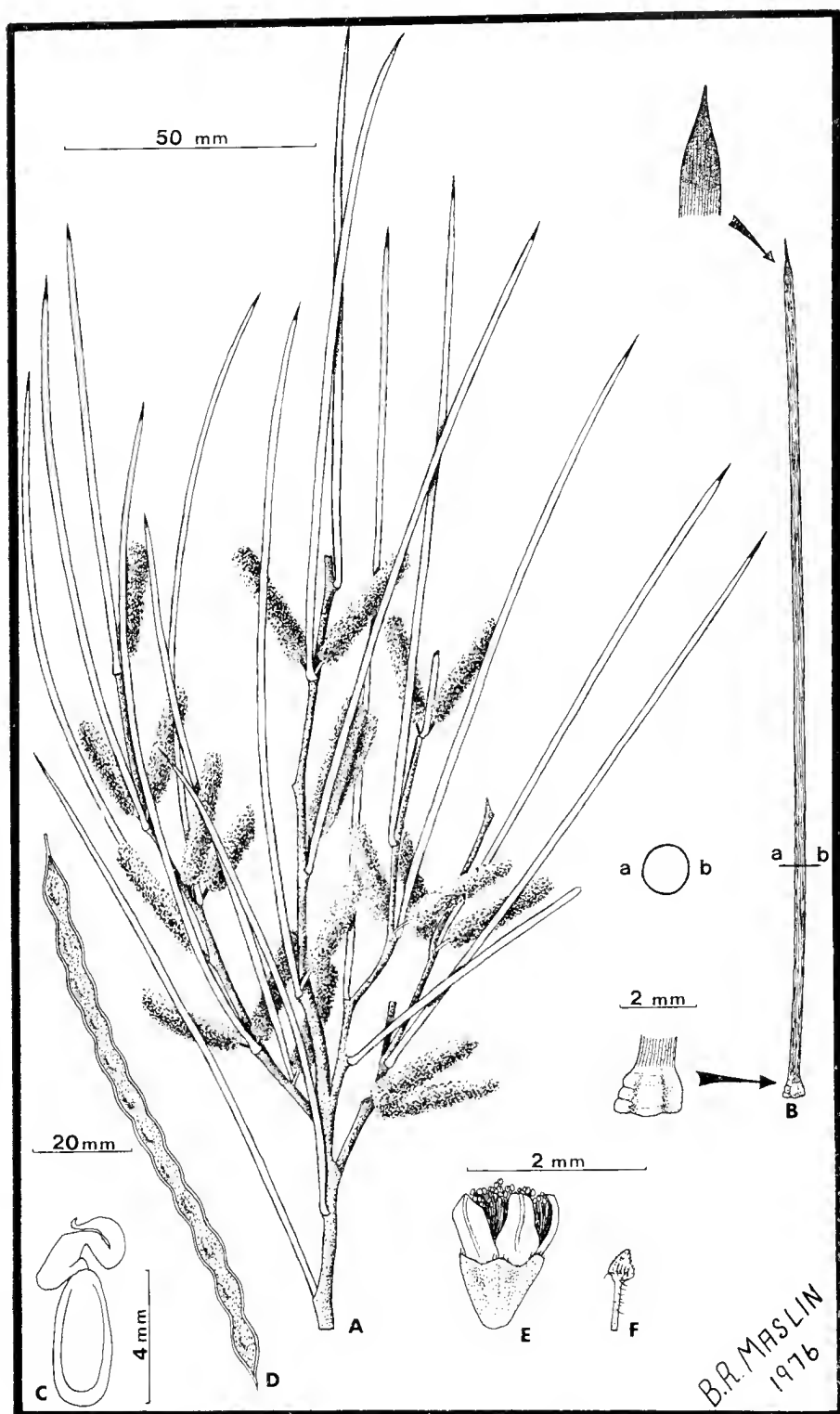
*Frutex* 1.5–3 m altus; *ramuli* stricti, ascendentes, glabri sed supra pulvinum dense tomentosi. *Stipulae* caducae. *Phyllodia* aciculara, (60) 80–125 (145) mm longa, 1 mm diam., teretia, ascendunt, aliquid rigida, glabra (sed prope basin puberula), subtiliter striata, aliquantum pungentia. *Glands* obscurae, 1–2 mm supra pulvinum posita. *Inflorescentia* simplex, plerumque 2/nodum; *pedunculi* 1.5–4 mm longi, puberuli; *capitula* cylindrica, ante anthesin 7–20 (26) mm longa. *Florae* 5-merae; *calyx* breviter triangulari-lobatus; *petala* glabra, 1-nervata. *Legumina* (immatura) linearia, ad 115 mm longa et 5 mm lata. *Semina* (immatura) in legumine longitudinalia.

[*Acacia cyperophylla* auct. non F. Muell.: Maiden, Forest Flora N.S.W. 6:277 (1917).]

[*Acacia aciphylla* in sched.—PERTH].

*Type*: Mount Gibson Station, between Wubin and Paynes Find, Western Australia, 29 Aug. 1976, B. R. Maslin 4230 (holo: PERTH; iso: CANB, K, MEL, NY).

*Shrub* 1.5–3 m tall, normally moderately branched at ground level; *bark* dark grey, fissured on main trunks towards their bases, otherwise smooth; *branches* straight, ascending, terete, very obscurely ribbed, glabrous but densely tomentose immediately above pulvinus, reddish brown with a light grey (often fissured) epidermis, lenticels quite apparent; *branchlets* light brown. *Stipules* caducous. *Phyllodes* acicular, (60) 80–125 (145) mm long, 1 mm diam., terete (circular in cross section), ascending, rather rigid, straight to slightly curved, glabrous (except on upper surface near pulvini where they are densely tomentose), grey-green (when dry), light green to slightly greyish green (when fresh), finely multistriate (striae not, or barely visible to unaided eye); *apex* straight or slightly uncinate, brown, somewhat pungent; *pulvinus* slightly dilated, orange, normally glabrous and obscurely wrinkled abaxially, concave and densely puberulous adaxially. *Gland* inconspicuous, situated on upper surface of phyllode 1–2 mm above pulvinus, a shallow densely tomentose groove extending from the gland to the pulvinus. *Inflorescences* simple, normally 2 per node; *peduncles* 1.5–4 mm long, moderately to densely puberulous (hairs normally antrorse); *basal peduncular bracts* absent at anthesis; *receptacles* glabrous; *flower heads* medium yellow, cylindrical, 7–20 (26) mm long just prior to anthesis. *Bracteoles* 0.8–1.3 mm long; *claws* linear, puberulous towards apex; *laminae* ovate, slightly keeled, slightly inflexed, ciliolate. *Flowers* 5-merous; *calyx* slightly exceeding  $1/2$  length of corolla, divided for  $1/6$ – $1/4$  its length into broadly triangular sparsely ciliolate lobes, tube obscurely 5-nerved and either glabrous or sparsely puberulous; *petals* ca. 1.5–2 mm long, connate for ca.  $1/2$  their length, glabrous, 1-nerved; *ovary* glabrous to densely papillose. *Legumes* (immature) linear, to 115 mm long and 5 mm wide, firmly chartaceous, flat, glabrous, greyish brown; *margins* barely thickened, variably contracted between seeds. *Seeds* (immature) longitudinal in legume; *funicle* filiform, expanded into a thickened convoluted *aril*.



*Distribution:* (Figure 7) Western Australia: It appears that *A. sibina* has a disjunct distribution. However, future sampling of the region between the western and eastern parts of its range may reveal *A. sibina* there. The western part of its range extends from Mullewa to Lake Moore and it is from this area that most collections have been made. The eastern part of the range extends from Comet Vale northeast to near Warburton. It is possible that *A. sibina* will eventually be recorded for Northern Territory and/or South Australia.

*Habitat:* *Acacia sibina* grows under a variety of conditions. In the western part of its range it occurs in sandy gravel, light brown to red loam, or yellow sand in dense "Wodjil" scrub (*Acacia-Melaleuca-Casuarina* association). West of Warburton *A. sibina* grows in red sand in hummock grassland with *Triodia* while northeast of Laverton it is common in patches on red sand with occasional Mulga (*Acacia aneura* F. Muell. ex Benth.).

*Flowering and fruiting period:* Flowers from August to October. Young legumes are generally found in late October or early November, though young legumes were present on one specimen collected from the Great Victoria Desert in June. Legumes with mature seeds have not been seen by me.

*Selected specimens:* WESTERN AUSTRALIA: Mullewa-Pindar road, G. Phillips for A. M. Ashby 4487 (MEL, PERTH); 8 mi (12.8 km) W of Pindar, J. S. Beard 6689 (NSW, PERTH); Karara Station, J. S. Beard 7197 (PERTH); 42 mi (67 km) SW of Warburton Mission, A. S. George 3977; Comet Vale, J. H. Maiden s.n., Sept. 1909 (NSW, PERTH—photograph); 16 km S of Morawa towards Perenjori, B. R. Maslin 3173 (BM, PERTH); Wilroy townsite, G. Phillips 93 (NT, PERTH).

Using Benthams classification (1864) *A. sibina* should be placed in the *Juliflorae-Stenophyllae*. In Western Australia it has previously been confused with *A. aciphylla* Benth. (p. . . . above). *Acacia sibina* is distinguished from *A. aciphylla* by its non-decurrent, perfectly terete phyllodes, its longer, cylindrical flower heads (obloid in *A. aciphylla*), and its longer, broader legumes. In its general phyllode and inflorescence morphology, *A. sibina* resembles *A. cyperophylla* F. Muell. ex Benth., but can be distinguished by its glabrous phyllodes, shorter peduncles, narrower and less woody legumes and smooth (except on main trunk where it is fissured) grey bark (not red and curling as on *A. cyperophylla*).

Maiden (1917, p. 277) provisionally referred a flowering specimen collected by himself from Comet Vale (99 km N of Kalgoorlie) to *A. cyperophylla* F. Muell. I have inspected Maiden's specimen, which is at NSW, and found it to be *A. sibina*.

The specific epithet alludes to the phyllodes whose shape resembles an unbarbed spear.

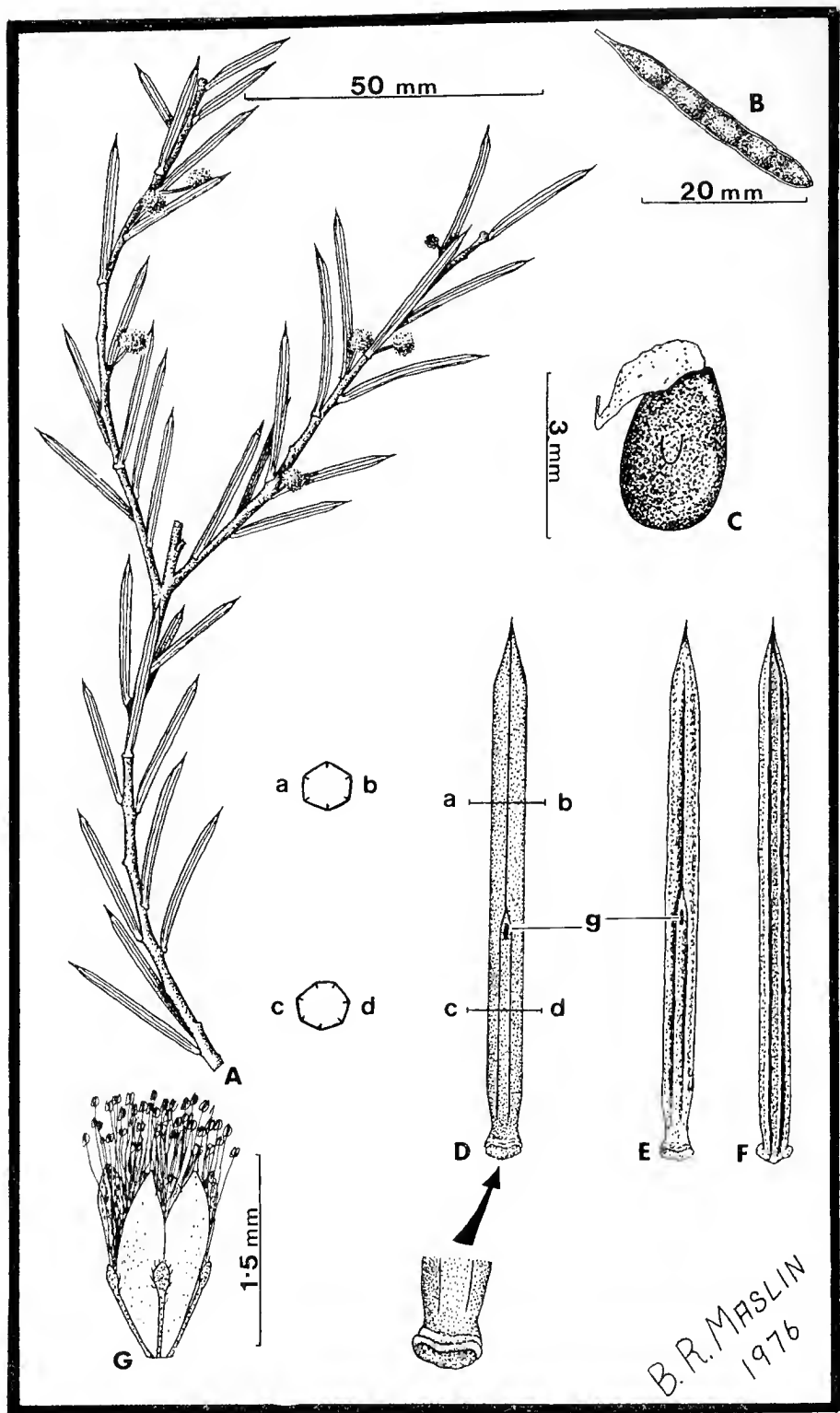
**6. *Acacia tetanophylla*** Maslin nom. et stat. nov., based on *A. triptycha* F. Muell. ex Benth. var. *pungens* E. Pritzel—Figure 6.

*Acacia triptycha* F. Muell. ex Benth. var. *pungens* E. Pritzel, Bot. Jb. 35:293 (1904). *Lectotype:* Kalgan River, 4 Oct. 1901, L. Diels 4596 (PERTH), *lecto nov.*

*Shrub* 1–1.3 m tall; *branches* glabrous or sometimes densely strigose. *Stipules* caducous. *Phyllodes* linear, 15–40 mm long, 1–1.5 mm wide, rigid, terete (appearing somewhat hexagonal in cross section when fresh, but upon drying the tissue between the nerves contracts giving the phyllode a sulcate appearance), straight or slightly curved, glabrous, light olive green or sometimes

Figure 5—*Acacia sibina* sp. nov. A—Upper portion of branch system. B—Phyllode (with insets showing apex, obscurely wrinkled pulvinus and transverse section showing circular outline). C—Seed (immature). D—Legume (with immature seeds). E—Flower. F—Bracteole.

A from G. Phillips 93; B, E–F from B. R. Maslin 3173; C–D from J. S. Beard 7179.



glaucous, 7-nerved (but on upper surface of phyllode 2 of these nerves unite immediately above the gland); *apex* pungent; *pulvinus* to 0.5 mm long, not prominently wrinkled, dilated at base. *Gland* not prominent, situated on upper surface of phyllode 5–15 mm above pulvinus. *Inflorescences* simple; *peduncles* 4–6 mm long (to 10 mm when in fruit), glabrous; *basal peduncular bracts* absent at anthesis; *flower heads* globular, with 13–18 flowers. *Flowers* 5-merous; *sepals* free, spatulate, brown (when dry), ciliolate at apex, claws glabrous to puberulous; *petals* very obscurely 1-nerved, yellow, glabrous. *Legumes* narrowly oblong, to 37 mm long and 4 mm wide, slightly undulate, raised over seeds, glabrous, brown; *margins* barely thickened, normally not contracted between seeds, yellow. *Seeds* longitudinal in legume, ellipsoid to obloid but truncated along margin adjacent to aril, slightly compressed, 2.5–3 mm long, 1.5–1.8 mm wide, black, slightly shiny; *pleurogram* not obvious; *funicle* filiform, reflexed below a thickened *aril* which is situated obliquely on seed.

*Distribution:* (Figure 7) South-west Western Australia: Occurring sporadically from just south of the Stirling Range east-northeast to the Ravensthorpe district.

*Habitat:* Occurs in sand or clay (often rocky) normally near watercourses.

*Flowering and fruiting period:* Flowers from September to October. Mature legumes have been collected in mid-December, but judging from some collections the fruiting period could extend to about mid-January.

*Selected specimens:* WESTERN AUSTRALIA:—Fitzgerald River reserve, B. R. Maslin 890 (CANB, PERTH); Near West River crossing, 37 km W of Ravensthorpe towards Jerramungup, B. R. Maslin 2579 (B, PERTH, S); Near West River crossing, K. Newbey 936D (K, PERTH).

Pritzel (1904, p. 293) described this taxon as *A. triptycha* F. Muell. ex Benth. var. *pungens*. As it is not closely allied to *A. triptycha* and because it is very distinctive morphologically, I have decided to give it specific rank. *Acacia tetanophylla* is distinguished from *A. triptycha* by its shorter, rigid, pungent, 6–7-nerved (not 8-nerved) phyllodes.

Using Bentham's classification (1864) *A. tetanophylla* should be placed in the *Pungentes-Plurinerves* near *A. sulcata* R.Br. The latter species is variable but can be distinguished from *A. tetanophylla* by its generally smaller, more slender, less pungent phyllodes and its conspicuous basal peduncular bracts.

The specific epithet refers to the characteristic rigid phyllodes. As *A. tetanophylla* is based on *A. triptycha* var. *pungens* it would be desirable to use this varietal epithet for the species, however, this name is preoccupied viz. *A. pungens* Spreng.

### Acknowledgment

Mr Alex George is gratefully acknowledged for his assistance in checking my Latin descriptions.

Figure 6—*Acacia tetanophylla* sp. nov. A—Upper portion of branch system. B—Legume. C—Seed. D to F—Phyllodes (D and E—upper surface of phyllode showing nerve dividing immediately above gland (g), D—fresh state with transverse sections showing nerve positions, E—dry; F—lower surface of phyllode, dry). G—Flower. A, D–G from B. R. Maslin 890; B from B. R. Maslin 2579; C from K. Newbey 936D.

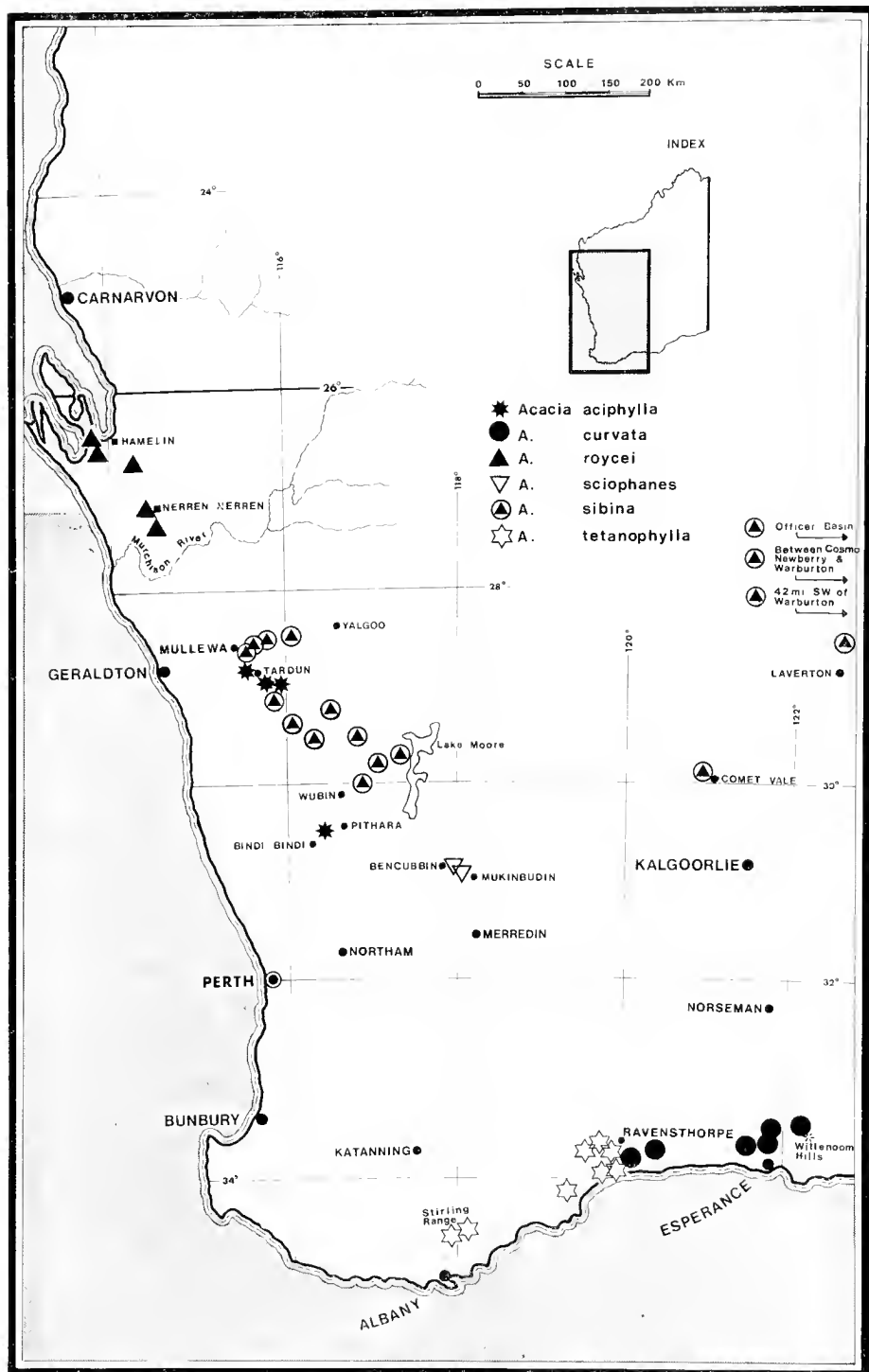


Figure 7—Distribution of *Acacia aciphylla*, *A. curvata*, *A. roycei*, *A. sciophanes*, *A. sibina* and *A. tetanophylla*.

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## Index to specimens studied

This index is arranged alphabetically according to the name of the collector. Numbers in parentheses refer to the corresponding taxon in the text.

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- Barker s.n., Sept. 1934 (5).
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- Bennett 2596 (2).
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- Cole 4 43 (5).
- Cough 79 (5).
- Daniels s.n., 9 June 1972 (2).
- Diels 4596 (6-Type).
- Donner 4507 (5).
- Drummond IV:14 (1-Type).
- Fairall 1369 (5).
- Gardner 2754 (4).
- George 3977 (5), 4422 (2), 8092 (5).
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- Morland M2 (5).
- Newbey 936 (6), 936D (6), 1765 (2-Type), 2645 (6).
- Phillips 93 (5).
- Wilson 10198 (6).

# The identity of *Acacia leiophylla* Benth. (Mimosaceae)

By B. R. Maslin<sup>†</sup> and D. J. E. Whibley<sup>\*</sup>

## Abstract

Until now, the name *Acacia leiophylla* has been thought to refer to a Western Australian species and has been generally regarded by most authors as a taxonomic synonym of *A. saligna* (Labill.) H. Wendl. (syn. *A. cyanophylla* Lindl.). It is shown that this species as circumscribed here occurs in South Australia and represents the same taxon that was subsequently described as *A. retinodes* Schlechtendal var. *oraria* J. M. Black ex C. M. Eardley. *Acacia leiophylla* is lectotypified (the type material consists of discordant elements), described and illustrated, its distribution mapped and its probable type locality (Kangaroo Island, S.A.) indicated.

## Introduction

In the past there has been considerable confusion concerning the application of the name, *A. leiophylla*. Generally this name has been regarded as a taxonomic synonym of *A. saligna* (Labill.) H. Wendl. (syn. *A. cyanophylla* Lindl.)—see Bentham (1864 and 1875) and Maiden (1906). In a previous paper, the first author (Maslin 1974) suggested that Bentham may have been incorrect in relegating *A. leiophylla* to synonymy under *A. saligna*. Having now studied both these species and having examined the types of the names involved, we now consider that this suggestion was correct.

The type material of *Acacia leiophylla* at Kew (K) consists of three sheets two of which support flowering specimens and one supports fruiting specimens. These sheets are labelled King George Sound<sup>‡</sup>, Baxter (erroneously given as "Bagster" on the lectotype sheet—see below). This syntype material is a mixture of two taxa: the flowering specimens are *A. leiophylla* (sensu lectotypico) and the fruiting ones *A. pycnantha* Benth. The lectotype of *A. leiophylla* has been selected from the flowering specimens. It is the lower left hand specimen labelled "King George's Sound, New Holland. Bagster. Hooker, 1835." on a sheet stamped "Herbarium Benthamianum, 1854" and annotated (in Bentham's handwriting) "*Acacia leiophylla* Benth Lond. Journ 1.350".

It will be noted that the collector given on the lectotype label is "Bagster" which is also the citation given in the original description of *A. leiophylla*. However, this is an orthographic error which Bentham corrected (to "Baxter") in *Flora Australiensis* vol. 2, p. 364. Other *Acacia* species for which Bentham made the same error of citation in his original description but subsequently corrected are *A. acuminata* Benth., *A. baxteri* Benth. and *A. triquetra* Benth.

According to Maiden (1909), William Baxter collected along the south coast of Western Australia (particularly around Albany i.e. King George Sound) and also on Kangaroo Island, South Australia. As the two taxa represented by the syntypes of *A. leiophylla* do not occur naturally at Albany but do grow on Kangaroo Island, it is reasonable to assume that the recorded type locality, King George Sound, is an error for Kangaroo Island. The same holds for *A. triquetra* Benth., a species which almost certainly is a taxonomic

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<sup>‡</sup> On two of the sheets this citation is abbreviated to "K. G. Sound". This locality is Albany on the south coast of Western Australia, about 400 km SSE of Perth.

synonym of *A. acinacea* Lindl. The type of *A. triquetra* is given as King George Sound, Baxter (sphalm. 'Bagster') but this species does not occur at this locality. It does, however, grow on Kangaroo Island.

The first author has compared the lectotype of *A. leiophylla* with the holotype of *A. retinodes* var. *oraria*. Although the former specimen is in flower and the latter in fruit, there is no doubt that they represent the same taxon.

### Taxonomy

*Acacia leiophylla* Benth., London J. Bot. 1:351 (1842). *Lectotype*: "King George's Sound, New Holland, Bagster"—this is how the lectotype is annotated but it is incorrect, see discussion above (K—lower left hand specimen on sheet, in flower; iso: K, PERTH fragment), *lecto. nov.* (Figure 1).

*Acacia retinodes* Schlechtendal var. *oraria* J. M. Black ex C. M. Eardley in J. M. Black, Flor. S. Austral., ed. 2 4:945 (1957), *synon. nov.* *Type*: Sleaford Mere, near Port Lincoln, Southern Eyre Peninsula, South Australia, 19 Nov. 1949, E. C. Black s.n. (holo: AD95701001).

*Shrub* 1–2.5 m tall, either dense, compact and single-stemmed, or spreading and openly branched with a number of stems arising from near ground level; *branchlets* terete but slightly angular towards apex.  $\pm$  flexuose, finely ribbed, glabrous, reddish. *Phyllodes* lanceolate, (75) 100–130 (165) mm long, (9) 15–22 (25) mm wide (at broadest point—which is generally above the middle of phyllode), falcate, glabrous, pale green, midrib obvious, lateral veins rather obscure; *pulvinus* (5) 9–12 (15) mm long, often slightly twisted, prominently wrinkled. *Gland* not very prominent, situated on upper margin of phyllode either at distal end of pulvinus or to 4–8 (15) mm above it. *Inflorescences* racemose (or sometimes paniculate at ends of branchlets due to phyllode reduction), numerous; *raceme axis* normally slightly flexuose, glabrous; *peduncles* 7–15 (21) per raceme, ca. 4 mm long, longitudinally wrinkled (when dry), glabrous; *flower heads* globular, with (24) 26–28 (31) flowers. *Bracteoles* peltate, conspicuous in inflorescence bud; *laminae* ca. 1 mm diam., medium to light brown, densely ciliate (hairs golden). *Flowers* 5-merous; *calyx*  $\frac{1}{2}$ – $\frac{3}{4}$  length of corolla, divided for  $\frac{1}{2}$ – $\frac{3}{4}$  its length into broadly triangular inflexed  $\pm$  keeled puberulous lobes (hairs white and golden), tube a little angular brown and glabrous; *petals* ca. 2 mm long, yellow, sparsely strigose, obscurely nerved. *Legumes* narrowly oblong, 90–125 mm long, 5–6 mm wide,  $\pm$  straight, firmly chartaceous, raised over seeds, glabrous, dark brown; *margins* slightly thickened, barely contracted between seeds, light brown. *Seeds* longitudinal (or slightly oblique) in legume, obloid, ca. 5 mm long and 2.5 mm wide; *funicle* long and  $\pm$  encircling seed in a double fold, dark coloured, gradually expanded into a pale yellowish curved *aril*.

*Distribution*: (Figure 2) South Australia from the vicinity of Coffin Bay (southern Eyre Peninsula) southeast through southern Yorke Peninsula, Kangaroo Island and The Coorong to near Mount Gambier. Although we have not seen any specimens from Victoria, it is most likely that future sampling of near-coastal regions around the border with South Australia will extend the range of *A. leiophylla* into Victoria.

*Habitat*: Occurs on calcareous sand or shallow, porous, red loam in coastal Mallee or Mallee-Heath vegetation. *Acacia leiophylla* is often associated with *Eucalyptus diversifolia* Bonpl., *Acacia pycnantha* Benth. and *A. longifolia* var. *sophorae* (Labill.) F. Muell.

*Flowering period*: August to November.

*Fruiting period*: November to January.

**SOUTH AUSTRALIA**: Hundred of Kiana, Flinders Highway, south of Lake Hamilton, C. R. Alcock 2692 (AD); Innes National Park (35 15'S, 136 55'E), C. R. Alcock 4569 (AD); Wooley's Lake, Beach port, 2 Dec. 1917, Herb. J. M. Black s.n. (AD); Kangaroo Island,

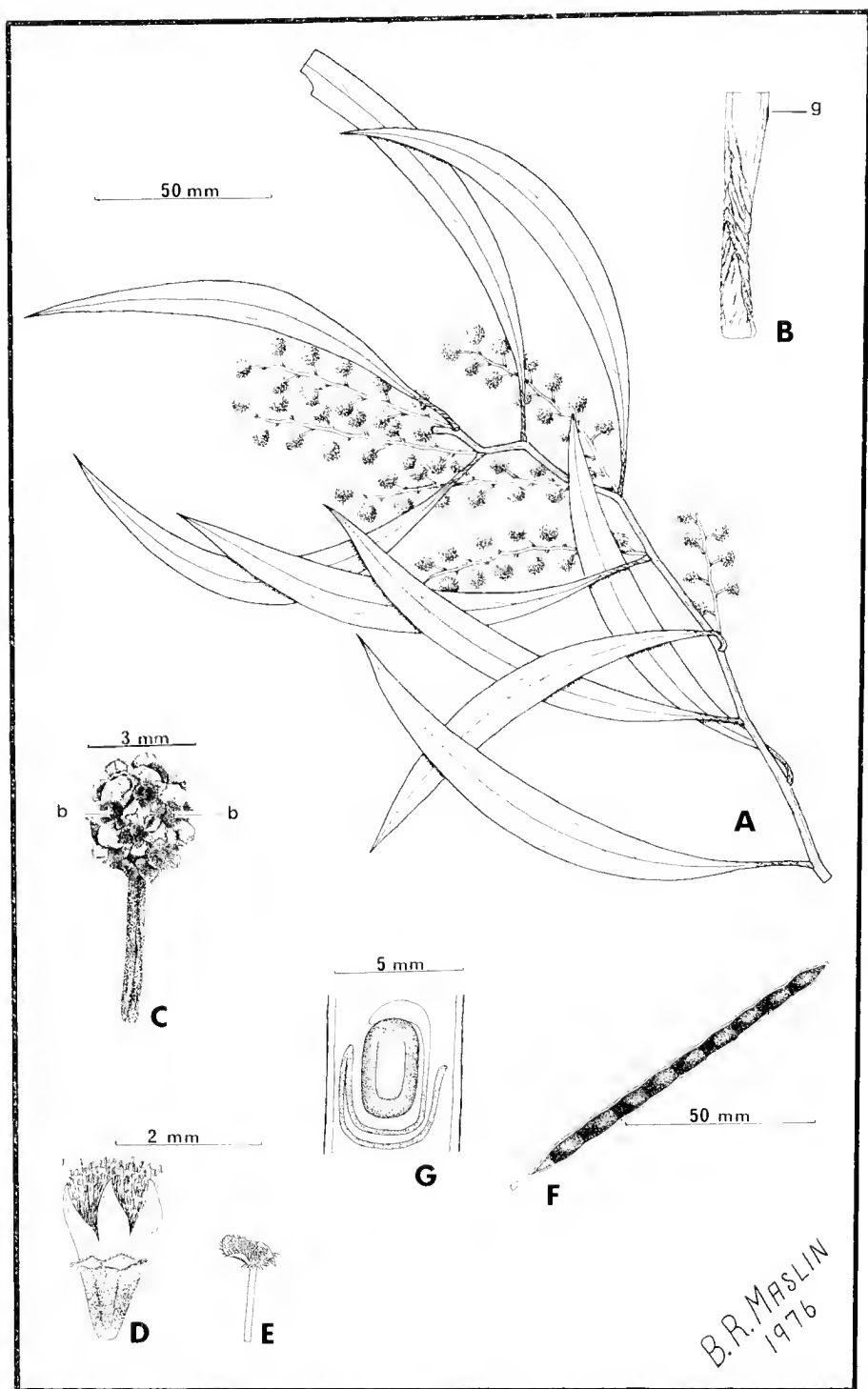


Figure 1—*Acacia leiophylla* Benth. A—Upper portion of branch. B—Base of phyllode showing gland (g) and slightly twisted, prominently wrinkled pulvinus. C—Unopened flower head showing prominent bracteoles (b). D—Flower. E—Bracteole (dry). F—Legume. G—Seed showing prominent funicle. A from L. D. Williams 5108; B, E from G. Jackson 288; C from D. J. E. Whibley 5524; D from C. R. Alcock 2692; F, G from E. C. Black s.n. (Type of var. *oraria*).

Muston (ca. 5 km S of American River), 11 Dec. 1964, *H. M. Cooper* s.n. (AD); Southern Yorke Peninsula, between west coast and Corny Point Stenhouse Bay road, *Hj. Eichler* 13934 (AD); Kangaroo Island, *G. Jackson* 288 (AD); Hundred of Uley Section 19, ca. 6 km S of Big Swamp (which is ca. 15 km ESE of Port Lincoln), *D. J. E. Whibley* 1857 (AD); 35 km S of Stenhouse Bay, *D. J. E. Whibley* 5524 (AD); Younghusband Peninsula, near mouth of Murray River (35° 37' S, 139° 2' E), *L. D. Williams* 5108 (AD); about 11·3 km due S of Meningie township (35° 47' S, 139° 19' 5' E), *L. D. Williams* 5615 (AD).

Because this taxon is rather distinctive morphologically and because it is so widely distributed, we consider it best be treated as a distinct species, for which the correct name is *A. leiophylla* Benth., rather than as a variety of *A. retinodes* Schlechtendal as Eardley has done. Taxonomically *A. leiophylla* lies between *A. retinodes* and *A. pycnantha* Benth. but has stronger affinities with the former species. All three species are referable to Bentham's *Uninerves-Racemosae* (Bentham, 1864).

The large, falcate, 1-nerved phyllodes, long racemose inflorescences, and narrowly oblong, glabrous, firmly chartaceous legumes with longitudinally placed seeds relate *A. pycnantha* to *A. leiophylla*. Indeed, as pointed out above, the fruiting syntype of the latter species is in fact *A. pycnantha*. *Acacia pycnantha* is distinguished from *A. leiophylla* by the following characters: flowers more numerous in the heads (50–80); petals glabrous; bracteole laminae smaller and densely white-ciliolate; funicles shorter, straighter and not encircling seeds; phyllodes darker green and tending to show more conspicuous

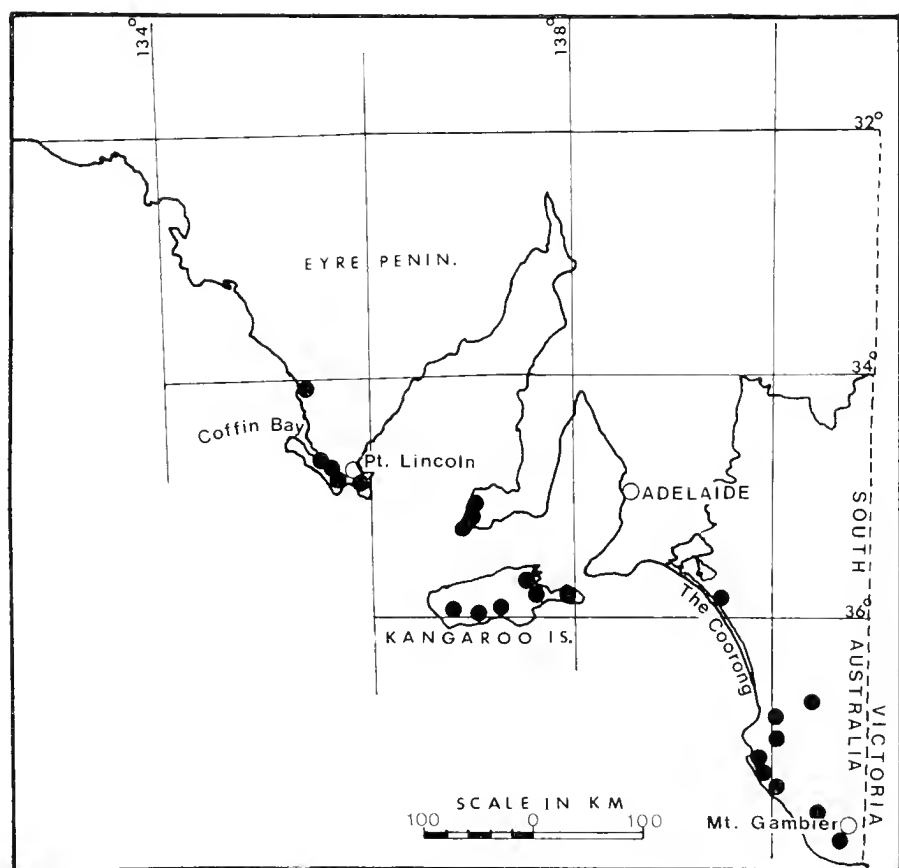


Figure 2 Distribution of *Acacia leiophylla* Benth.

lateral veins. The 1-nerved phyllodes, racemose inflorescences and the general legume characters (especially the long funicles encircling the seeds in a double fold) of *A. retinodes* relate this species to *A. leiophylla*. *Acacia retinodes* is distinguished from *A. leiophylla* by the following characters: pulvini shorter (2–4 mm); bracteole laminae smaller, less conspicuous in the buds and bearing  $\pm$  longer, white to very pale yellow marginal hairs; petals glabrous; flower heads somewhat smaller in diameter (however, the number of flowers may reach 50 per head, thus exceeding those on *A. leiophylla*); phyllodes straighter and less coriaceous; branchlet apices with a tendency to be more acutely angular.

### Acknowledgements

We wish to express our appreciation for the assistance given by the Director, Royal Botanic Gardens, Kew, for the loan of the type of *A. leiophylla*. The first author also wishes to thank the Australian Biological Resources Study Interim Council for providing the funds for travel to Kew where preliminary work concerning this study was commenced.

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